University of Wyoming

Cooperative Research Report to the Bureau of Land Management

1964 RESULTS

HALOGETON RESEARCH

Arid Land Studies of Grazing Treatments, Ecology, Shrub Improvement and Control, and Moisture Relationships

Submitted by Wyoming Agricultural Experiment Station

April 1965

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S E C T I O N I

WINTER SHEEP GRAZING STUDY ON SALTSAGE RANGE (GREYBULL)

Introduction

The experimental pastures used in the winter sheep grazing study were established in 1956 by cooperative agreement between the Bureau of Land Management, the Bureau of Reclamation, and the Wyoming Agricultural Experiment Station.

The study initiated by the above agencies had three objectives. These were to determine the effect of different grazing intensities on:

1. the spread of halogeton (Halogeton glomeratus);
2. the production of saltbush;
3. the sheep response, measured in terms of weight change.

The third objective was discarded after the 1960 study because of the greatly increased number of sheep needed to obtain the desired grazing intensities in a short period of time. It was also felt that the decreased grazing period would make any comparison of weight between different intensities meaningless.

The pastures are located approximately 15 miles northwest of Greybull, Wyoming (T53N, R95W, Sec. 3) in an arid area dominated by Nuttall saltbush (Atriplex nuttallii). An average of 5.48 inches of precipitation has fallen during the past five years as measured by the University of Wyoming rain gauge (Table 1). It is of interest to note that more than 80 percent of the moisture, an average of 4.46 inches since 1960, occurred during the period from April 15 to October 15.

Methods and Procedures

The study area consists of 640 acres which are divided into fenced pastures. The original modified randomized block design, which was employed from 1956 through 1962, consisted of a holding pasture and two replications of pastures for light, moderate, and heavy utilization, at 20, 40, and 80 percent use, respectively. These replicated pastures were 160, 80, and 40 acres in area. Following the 1962 grazing season, it became apparent that response, measured in terms of saltbush production, was significantly different among the three rates of utilization. To more accurately determine the optimum rate of utilization a new treatment was initiated. The 160-acre light use pastures were each divided into two 80-acre pastures. Optimum use on pastures 4a and 7a remained at 20 percent, but was increased to 30 percent on pastures 4b and 7b. A map of the pasture design (Figure 1) with locations of permanent 2' x 20' and 4' x 4' plots follows.

TABLE I. PRECIPITATION DATA (IN INCHES) FROM UNIVERSITY OF WYOMING RAIN GAUGES, DRY FORK HALOCETON PASTURES, 1960-1963.

Precipitation Periods	1960	1961	1962	1963	1964	Avg.	Percent of Total
Winter October 15-April 15	1.00	0.87	0.81	1.34	1.09	1.02	18.61
Spring April 15-July 1	0.60	1.35	3.01	3.78	5.59	2.87	52.37
Summer July 1-September 1	0.72	0.11	1.35	0.21	1.15	0.71	12.96
Fall September 1-October 15	0.40	1.82	0.30	1.82	0.06	0.88	16.06
TOTAL	2.72	7.15	5.47	7.15	7.89	5.48	100.00%
Growth Period Total	1.72	3.28	4.66	5.81	6.80	4.46	

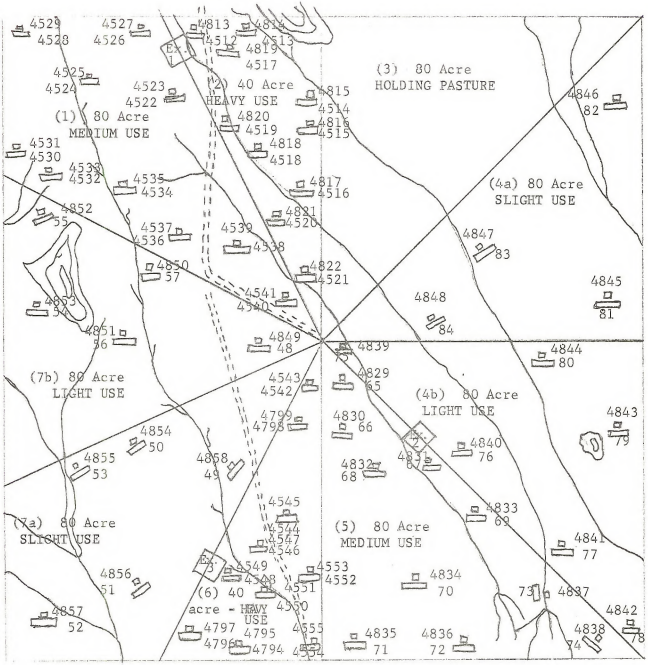
Production of saltbush was determined by clipping 10 plots (5' x 20') each 100 square feet in area, in each pasture prior to the grazing season. Utilization measurements were taken by similar procedures following the removal of the sheep. However, due to a heavy snowfall which came within a day after the removal of the sheep, it was possible to complete the clipping only on one pasture at that time. Final clipping was completed on March 7, 1965.

Vegetational analyses were conducted by the point frame method on ten permanent 50-foot line transects in each pasture. Vegetation was evaluated on the basis of 300 point recordings on each transect by systematic placement of the point frame which contained 10 pins.

In past years the sheep were divided into smaller groups - one group for each pasture - according to the amount of saltbush that needed to be removed to attain the desired utilizations, and all pastures were grazed the same length of time. This resulted in a differential utilization pattern within the pastures - particularly the lighter use pastures - where most of the grazing was confined to the area nearest the watering tanks. In an effort to improve the animal distribution within the pastures and to graze the sheep under more natural conditions, the sheep, this year, were kept in a single herd, and the different utilizations were accomplished by varying the time the sheep were in each pasture. Grazing time for each pasture was based on a consumption rate of 4 pounds saltbush per sheep per day.

PASTURE DESIGN OF GRAZING STUDY IN BIG HORN BASIN HALOGETON PASTURE

Location Map For 2x20 and 4x4' Plots - Prepared 1964



A total of 900 sheep - 867 ewes and 33 rams - were grazed in the 8 treatment pastures for a total of 17 days and another 5 days in the holding pasture during the period of October 27 to November 18. The sheep were again furnished by Mr. Harry (Smokey) Grabbert of Emblem to whom the authors are most grateful.

The water was hauled to the sheep in a 1350 gallon tank rented from the city of Lovell and with a 5-ton truck furnished by the Bureau of Land Management in Worland. The sheep were furnished all the water they would drink which proved to be about three gallon per sheep per day.

1964 Results

The production values of saltbush for each pasture are shown in Table 2. The slight and light use pastures continued to significantly out-produce the moderate and heavy use pastures; 394 and 347 pounds air-dry saltbush per acre for the slight and light use pastures respectively as compared to 297 and 273 pounds for the moderate and heavy use pasture, respectively. It should be noted that there is no real difference between the moderate and heavy use pastures as far as yield is concerned.

Visual inspection of the pastures, however, shows great differences in aspect. In the heavy use pastures the large clumps of saltbush have deteriorated into small units and ground level has become much more uniform. Annual weeds are much more abundant. Many saltbush seedlings are present also, indicating its adaptability to the climate and environment.

Annual production trends of saltbush are shown in Figure 2. The extreme variation between years is clearly related to precipitation, especially that which occurs from April 15 to June 30. Precipitation and production have increased during the past five years. A slight downward trend in production can be noted on the heavier use pastures in 1964. Although spring and summer precipitation was high, only 0.06 inches of rain occurred from September 1 to October 15. Much plant deterioration and shattering occurred which influenced plant production estimates in a downward trend.

Data showing sheep days per acre and percent utilization of saltbush are given in Table 3. Although final clipping for measurement of utilization was delayed until March, 1965 due to early snow cover, the estimates of sheep use are near the optimum desired rates. Pasture 7b, which was clipped immediately after completion of the grazing period, was reclipped in March to provide a standard to allow for adjustment of weights due to the time lag.

The percent vegetative cover and percent composition of the saltbush (Tables 4 and 5) are in good agreement with the production data. In fact the correlation between percent vegetative cover and yield (Figure 3) is surprisingly high. More than 94 percent of the variation in saltbush production is directly attributable to the relationship with percent cover.

TABLE 2. PRODUCTION OF SALTSAGE UNDER DIFFERENT INTENSITIES OF GRAZING (POUNDS AIR-DRY FORAGE PER ACRE) ON THE DRY FORK HALOGETON PASTURES - 1964.

	Rate of Utilization and Pasture Numbers								
	Slight - 20%		Light - 30%		Moderate - 40%		Heavy - 80%		Mean
Year	4a	7a	4b	7b	1	5	2	6	
1958	166.8	165.9			136.8	186.7	117.1	184.8	159.7
Mean	166.4				161.8		150.9		
1959	225.9	221.1			212.9	255.9	107.5	235.8	209.8
Mean	223.5				234.4		171.6		
1960	129.2	95.6			106.3	108.9	71.7	67.9	96.6
Mean	112.4				107.6		69.8		
1961	152.9[a]	119.1[abc]			102.1[bc]	121.6[ab]	42.9	85.1[c]	103.9
Mean	136.0				111.8		64.0		
1962	282.2[d]	300.8[d]			232.3[bc]	242.5[c]	201.6[ab]	197.8[a]	242.9
Mean	291.5[c]				237.4[b]		199.7[a]		
1963	404.0	382.0	378.0	367.0	318.0	390.0	302.0	362.0	362.8
Mean	393.0		372.5		354.0		332.0		
1964	375.4	412.6	301.7	392.1	290.2	303.6	290.8	255.1	327.7
Mean	394.0[a]		346.9[abc]		296.9[cd]		273.0[d]		

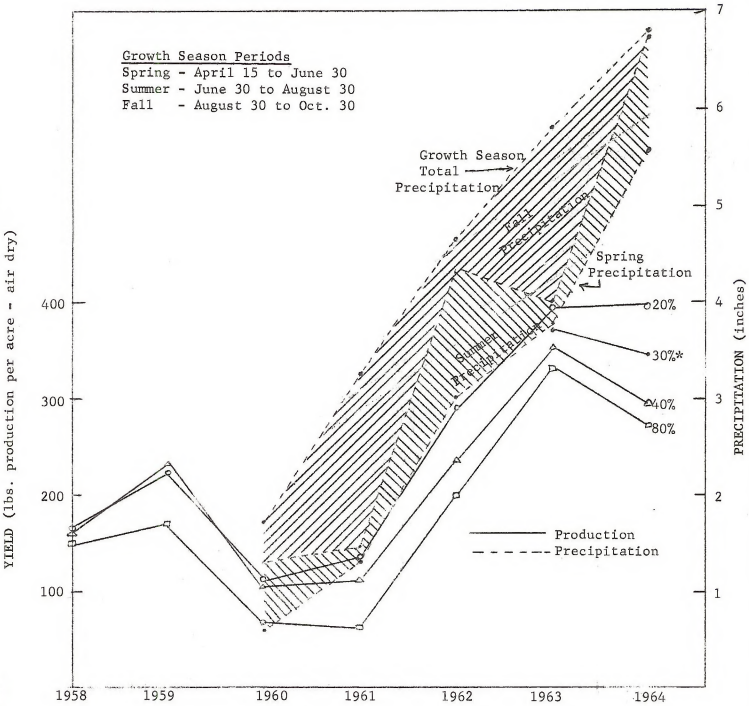


Figure 2. Production trends of Nuttall's saltbush as influenced by rate of utilization on the Dry Fork Halogeton Pastures and precipitation amounts during three periods of each annual growth season (April 15 to October 15).
*Initiated in 1963

TABLE 3. SHEEP DAYS PER ACRE AND PERCENTAGE UTILIZATION UNDER DIFFERENT INTENSITIES OF GRAZING ON THE DRY FORK HALOGETON PASTURES - 1964.

	Sheep Days Per Acre	Percent Utilization of Saltsage
Slight Use - 20%		
1958	9.51	6.5
1959	14.77	31.3
1960	7.79	11.6
1961	6.95	17.8
1962	14.63	28.6
1963	19.62	19.5
1964	17.06	20.4
Mean	12.90	18.5
Light Use - 30%		
1963	27.87	28.4
1964	23.30	22.1
Mean	25.58	25.2
Moderate Use - 40%		
1958	18.48	36.0
1959	30.47	54.0
1960	13.79	39.5
1961	12.31	30.4
1962	23.63	48.3
1963	35.37	38.4
1964	26.44	38.9
Mean	22.90	40.8
Heavy Use - 80%		
1958	34.50	54.6
1959	55.31	86.6
1960	16.82	74.1
1961	15.08	81.0
1962	37.13	71.4
1963	66.25	90.3
1964	52.75	78.2
Mean	39.69	76.6

TABLE 4. PERCENTAGE VEGETATIVE COVER, UNDER DIFFERENT INTENSITIES OF GRAZING ON THE DRY FORK HALOGETON PASTURES. 1964.

	20%		30%		40%		80%	
	Slight Use		Light Use		Moderate Use		Heavy Use	
Species	4a	7a	4b	7b	1	5	2	6
Atriplex nuttallii	15.03	18.16	11.53	18.10	10.07	12.23	12.06	9.53
Halogeton glomeratus	---	.03	---	---	.23	.10	1.13	1.10
Descurania pinnata	---	.30	.03	---	---	.03	.10	.03
Lepidium densiflorum	.03	---	.03	.33	.10	.20	---	.10
Artemisia spinescens	---	---	---	.07	.43	.07	---	.20
Opuntia polyacantha	.03	.13	.10	.07	.13	.17	.13	.10
Astragalus spp.	---	---	---	---	.73	.07	---	.23
Musineon divaricatum	---	---	---	.07	.10	---	.03	---
Oenothera albicaulis	.30	.03	.17	.37	.13	.47	.60	.43
Machaeranthera tanecitifolia	---	.40	---	.23	---	.03	---	.07
Sphaeralcea coccinea	---	---	---	---	.17	.03	---	.13
Lappula texana	.33	1.23	.13	1.23	.10	.13	1.33	.60
Gilia pumila	.03	.23	.03	.13	.07	---	---	.30
Monolepis nuttallii	---	.03	---	.03	---	---	.27	---
Allium textile	.10	.40	.10	.43	.17	.13	.13	.20
Salsola kali	---	---	---	---	.07	.03	.03	.10
Euphorbia serphyllifolia	---	.03	---	.03	.20	.10	.10	---
Sisymbrium altissimum	---	---	---	---	---	.03	---	---
Sitanion hystrix	.07	.17	.03	.27	.27	.70	---	.53
Poa secunda	---	---	---	.10	---	.07	---	---
Oryzopsis hymenoides	---	---	---	---	.13	---	.17	---
Agropyron smithii	---	---	---	---	---	---	.03	---
PASTURE TOTALS	15.89	21.14	12.15	21.46	13.10	14.59	16.08	13.68
Treatment Means	18.52		16.80		13.84		14.88	

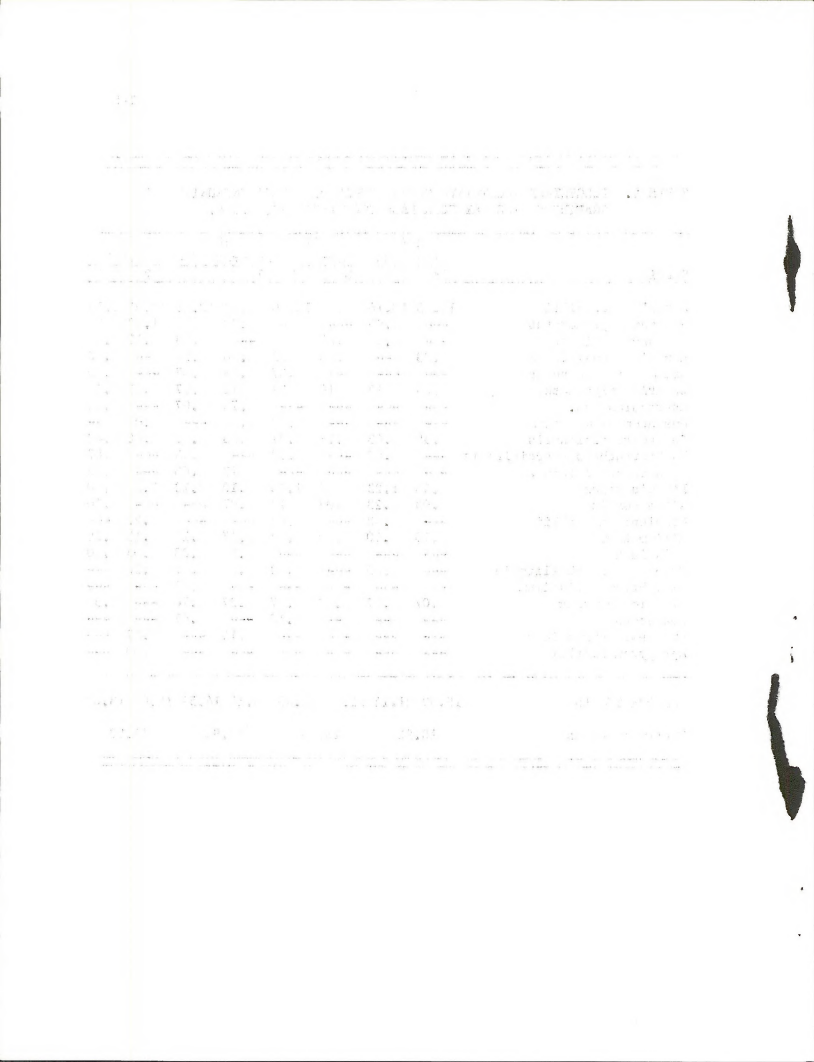
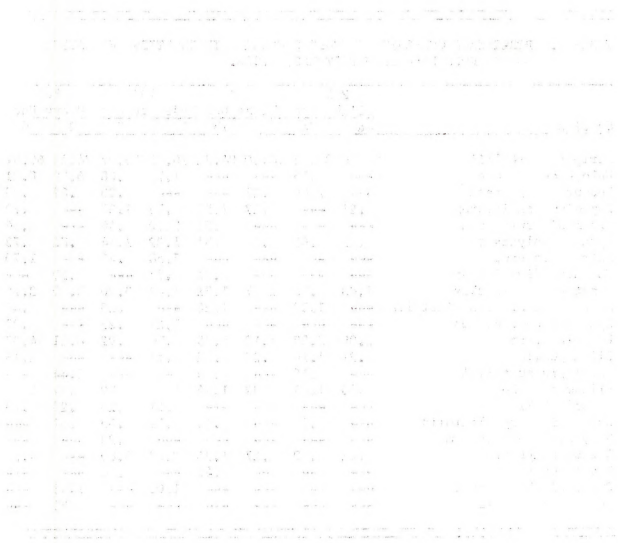


TABLE 5. PERCENTAGE COMPOSITION UNDER DIFFERENT INTENSITIES OF GRAZING ON DRY FORK HALOGETON PASTURES. 1964.

	20% Slight Use		30% Light Use		40% Moderate Use		80% Heavy Use	
Species	4a	7a	4b	7b	1	5	2	6
Atriplex nuttallii	94.34	85.84	94.80	84.32	76.65	83.97	74.32	69.41
Halogeton glomeratus	---	.16	---	---	1.78	.68	6.98	8.01
Descurania pinnata	---	1.60	.27	---	---	.23	.62	.23
Lepidium densiflorum	.21	---	.27	1.55	.76	1.37	---	.73
Artemisia spinescens	---	---	---	.31	3.30	.46	---	1.46
Opuntia polyacantha	.21	.63	.82	.31	1.02	1.14	.82	.73
Astragalus spp.	---	---	---	---	5.58	.46	---	1.70
Musineon divaricatum	---	---	---	.31	.76	---	.20	---
Oenothera albicaulis	1.88	.16	1.37	1.71	1.02	3.20	3.70	3.16
Machaeranthera tanecitifolia	---	1.89	---	1.24	---	.23	---	.48
Sphaeralcea coccinea	---	---	---	---	1.27	.23	---	.97
Lappula texana	2.09	5.83	1.10	5.75	.76	.92	8.21	4.37
Gilia pumila	.21	1.10	.27	.62	.51	---	---	2.18
Monolepis nuttallii	---	.16	---	.16	---	---	1.44	---
Allium textile	.63	1.89	.82	1.24	1.27	.92	.82	1.46
Salsola kali	---	---	---	---	.51	.23	.20	.73
Euphorbia serphyllifolia	---	.16	---	.16	1.52	.69	.62	---
Sisymbrium altissimum	---	---	---	---	---	.23	---	---
Sitanion hystrix	.42	.79	.27	1.24	2.03	4.80	---	4.12
Poa secunda	---	---	---	.48	---	.46	---	---
Oryzopsis hymenoides	---	---	---	---	1.02	---	1.03	---
Agropyron smithii	---	---	---	---	---	---	.20	---



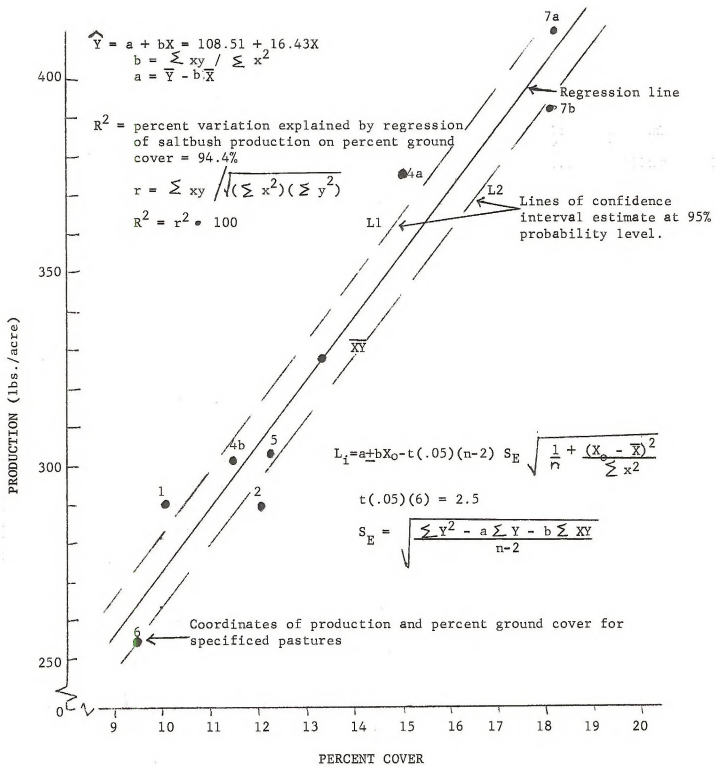


Figure 3. Regression and correlation analysis of Nuttall's saltbush production in pounds air dry forage per acre on percent ground cover on the Dry Fork Halogeton Pastures. 1964

Based on a 0.05 percent probability level, measures of cover can be converted to rather precise estimates of production. These data are applicable only to the 1964 measurements since variation in rainfall has a very strong influence upon production.

Future analyses will be conducted to determine the correlation of time and amount of precipitation to saltbush cover and production. The data in Table 6 show a definite upward trend of saltbush cover since 1956. This is definitely related to the general increase in annual precipitation.

TABLE 6. ANNUAL PRECIPITATION AND PERCENT COVER BY PASTURES OF NUTTALL'S SALTBUSH UNDER DIFFERENT INTENSITIES OF UTILIZATION ON THE DRY FORK HALOGETON PASTURES. 1956 to 1964.

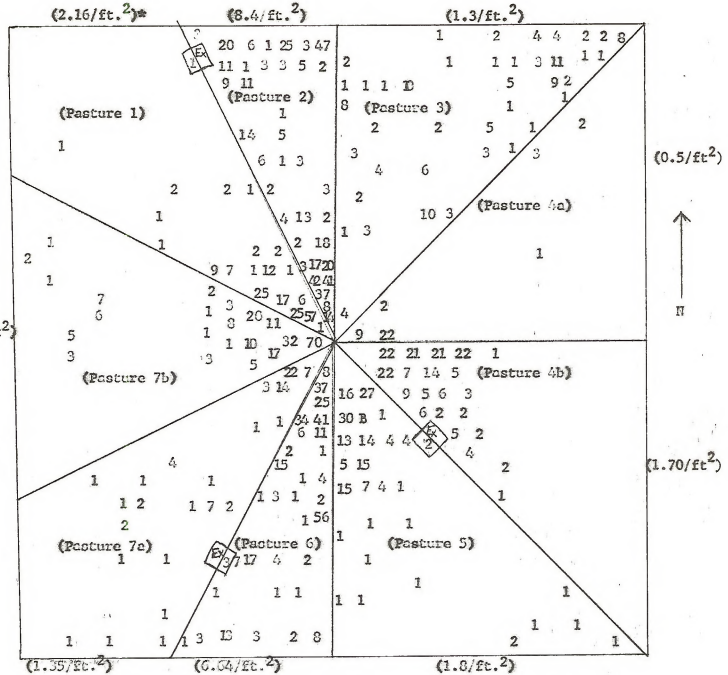
	Annual	20%		30%		40%		80%	
	Precip.	Slight Use		Light Use		Moderate Use		Heavy Use	
Year	(inches)	4a	7a	4b	7b	1	5	2	6
1956	2.26	2.1	2.1			2.5	2.5	2.3	2.3
1957	5.93	13.4	11.9			11.6	10.4	7.0	6.8
1958		--	--			--	--	--	--
1959	5.62	--	--			--	--	--	--
1960	2.72	12.5	13.7			14.7	11.0	7.5	12.3
1961	4.15	--	--			--	--	--	--
1962	5.47	14.2	12.8			14.2	16.3	12.8	11.3
1963	7.15	18.0	18.9	18.9*	20.5	17.0*	20.5	14.9	12.8
1964	7.89	18.0	18.2	11.5	18.1	10.1	12.2	12.1	9.5

*Initiated in 1963

There was a general decrease in the grasses and forbs as compared to last year. This is no doubt a moisture relationship. The decrease in moisture during the latter part of the season resulted in fewer plants, less cover per plant, and caused many plants to wither and dry before the readings were taken. The sharp decrease in percent vegetation cover of pricklypear (Opuntia polyacantha) - an average of 2.32 for all pastures in 1963 to .11 in 1964 - is somewhat surprising and not readily explained.

Another objective of this study has been to relate grazing intensity to spread of halogeton (Halogeton glomeratus). As can be seen in Tables 4 and 5, the halogeton is limited almost entirely to the moderate and heavy use pastures.

In addition to the point data in Tables 4 and 5 a general survey was made during the summer of 1964 by the use of plant counts in a series of square foot quadrats within each pasture (Figure 4). These data show a definite response in numbers of halogeton plants to rate of utilization by sheep. The data are given in Table 7.



* Number of halogeton plants per square foot.

Scale 6½" = 1 mile

Figure 4. Distribution and numbers of halogeton plants per square foot on the Dry Fork Halogeton Pastures. 1964

TABLE 7. NUMBERS OF HALOGETON PLANTS PER SQUARE FOOT BY PASTURE ON THE DRY FORK HALOGETON PASTURES, 1964.

Rate of Utilization	Pasture Number	No. of Plots	Aug. No. of Plots/ft^2	Aug. by Rate of Use
80% Heavy	2	50	8.4	7.5
	6	50	6.6	
40% Moderate	1	80	2.2	2.0
	5	100	1.8	
30% Light	4b	100	1.7	1.8
	7b	100	2.0	
20% Slight	4a	80	.5	1.0
	7a	100	1.4	1.0

Number and distribution of halogeton plants were greater and more widespread under heavy than under lighter use. Although saltbush production has shown some decrease due to rate of use, other factors such as number of halogeton plants and general aspect indicate a very significant change in the heavy use pastures.

Utilization immediately after grazing was only determined on one pasture due to an early snow cover, but the results indicated that the desired utilization had been achieved. The actual utilization was only two percent from the desired. Each pasture was inspected visually following the removal of the sheep. These estimates of utilization indicated that the utilizations were approaching the desired level. This and the results from the pasture that was clipped are good indications that the desired levels of utilization were reached in all pastures. The visual inspections also revealed that keeping the sheep in one group resulted in improved animal distribution within each pasture.

On March 5-7, 1965 all pastures were clipped for utilization estimates. Some variation occurred, notably in pastures 4b and 7b in which apparent use was less than the optimum (Table 3).

S E C T I O N II

SPRING STEER GRAZING STUDIES ON SALTBUSH RANGE AND SEEDED WATERSPREADERS (WORLAND)

1964

Introduction

The North Fork Experimental Pastures, located on the North Fork of the 15-mile drainage (R27W, T48N, S30), were established in 1960 by cooperative agreement between the Bureau of Land Management and the Wyoming Agricultural Experiment Station. These pastures are located approximately 12 miles west of Worland, Wyoming in an area dominated principally by Nuttall saltbush (Atriplex nuttallii). Annual precipitation is light - an average of 6.49 inches occurred over the last five years (Table 1).

TABLE 1. PRECIPITATION DATA (IN INCHES) FROM UNIVERSITY OF WYOMING RAIN GAUGE, NORTH FORK EXPERIMENTAL AREA. 1960 - 1964.

	YEARS						Percent
Precip. Periods	1960	1961	1962	1963	1964	Avg.	of Total
Winter							
Oct. 15 - Apr. 15	--	1.85	1.13	1.19	1.28	1.36	20.95
Spring							
Apr. 15 - July 1	2.06	2.44	3.82	4.75	--	3.27	50.39
Summer							
July 1 - Sept. 1	0.93	0.34	1.32	0.53	.24	.67	10.32
Fall							
Sept. 1 - Oct. 15	1.42	2.75	0.60	1.19	.01	1.19	18.34
Total	--	7.38	6.87	8.66	--	6.49	100.00
Growth Period Total							
(April 15 to Oct. 15)	4.41	5.53	5.74	6.47	--	5.13	

Two pastures were established for comparison of animal and vegetation responses. One pasture, which consisted of 521.3 acres, was treated with waterspreaders and seeded to crested wheatgrass (Agropyron cristatum), tall wheatgrass (Agropyron elongatum), and fireweed (Kochia scoparia). Seeding was conducted on approximately 190 acres of the spreader system in 1960. It was found during the summer of 1963 that a successful grass stand was established on 42 acres. The untreated check pasture consisted of 488.8 acres of native saltsage (Atriplex nuttallii) range. A map of the pastures with spreader dike and plot locations was presented in the 1963 report. For the past five years, the yearling steers used in the study have been furnished by the Wyoming Agricultural Substation at Powell, Wyoming.

BOARDING HOUSE (MEATING) STUDIES IN
PLATEAU OF LOWER AND MIDDLE CARBONIFEROUS (MISSISSIPPIAN)

1954

Introduction

[illegible] Experiment Station, Iowa, [illegible] and the Weather Bureau [illegible] Weather Bureau. Annual precipitation is [illegible] range of 24.00 inches occurred over the last five years (Table 1).

Year	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1.65	1.13	1.15	1.25	1.36	10.05
[illegible]	2.05	2.60	3.03	4.25	--	3.07	20.2
[illegible]	0.21	0.36	1.22	0.35	.24	.07	10.02
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	--	[illegible]	[illegible]	--	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] were established for comparison of natural and vegetation [illegible]. The station, which consisted of 321.3 acres, was created [illegible] and leased to create a [illegible] (Lawrence [illegible]), [illegible] (Lawrence City Area), and Kiowa (Little [illegible]). [illegible] was carried on experimentally 100 acres of the station [illegible] 1954. It was found during [illegible] of 1954 that a successful grass [illegible] was established on 62 acres. The method of each [illegible] of hay, a crop of [illegible] (Virginia mixture). A crop [illegible] the planting [illegible] and plot locations was presented in the 1954 report. For the next years, the yearling steers used in the study were furnished by the Oneida Agricultural Laboratory at

Methods and Procedures

One hundred and four steers were grazed for 73 days - May 12 to July 24 - during the summer of 1964. Twenty-six steers - 17 Angus and 9 Hereford - were grazed in the check pasture and 78 steers - 50 Angus and 28 Hereford - were grazed in the treated pasture. The steers were weighed May 12 prior to being placed in the pastures, June 12 while in the pastures, and July 24, just prior to removal. Before the initial and final weighing, the steers were kept from feed and water for a 12-hour period. For the June weighing the steers were kept away from feed and water for six hours.

The steers for this experiment were furnished by the University of Wyoming Experiment Station at Powell, Wyoming and had previously been used in a 147-day roughage feed trial. Half of the steers were fed corn silage and alfalfa plus two pounds of ground barley per head per day. At the end of the feed trial the steers receiving barley were approximately 70 pounds heavier than those not receiving barley in their ration. The two previous feed treatments were equally represented in both of the test pastures.

Vegetation analyses were conducted by the point-frame method. Permanent line transects 50 feet long were established in each pasture on which contiguous point frames were placed. In the treated pasture, analyses were conducted on three kinds of sites: (1) seeded areas adjacent to the dikes where a stand of grass was established, (2) unaffected areas of native saltbush range remote from the immediate dike area, and (3) inter-dike areas where the vegetation was destroyed during dike construction, but where seeded grasses failed to establish.

Production in the untreated check pasture and on the native vegetation of the treated pasture was determined by clipping plots 9.6 sq. ft. in area, which were systematically located along each vegetational analysis transect. These plots were caged prior to the grazing period and clipped just prior to the removal of the steers from the pasture. The 9.6 sq. ft. cages in the seeded areas were trampled and moved by the steers to the extent that production data were unreliable. Production in these areas was determined by clipping fifteen 4 x 4 ft. quadrats which were located in parts of the ungrazed spreader system that extended outside the fenced pasture. Utilization of the grass in the seeded areas was determined on a weight basis. Ten 4 x 4 ft. quadrats randomly located within the grazed seeded area were clipped to determine amount of remaining forage. The difference between the production in the non-grazed seeded area and the remaining forage in the grazed areas was considered the utilized forage.

Utilization of saltbush (Atriplex nuttallii), was estimated on the basis of percentage of weight removed. Ungrazed plants within the caged plots were visually compared with grazed plants outside the cages.

Labor and Materials

Labor was plentiful and cheap. Men were paid 75 cents - $1.00 an hour and boys 50 cents. Women received 25¢ - 50¢ per hour. Harvesting was done by hand. Men cradled the grain and women bound it into sheaves. Threshing was done by a steam engine and separator. Men fed the machine and pitched the straw into stacks. Women and children carried water to the workers and cooked meals for them.

Most of the farm implements were purchased from the Massey-Harris Company. Some were bought from the Frost & Wood Company of Smith's Falls, Ontario. Others were purchased from the Cockshutt Plow Company of Brantford, Ontario. Some of the implements were bought from the Gilson Manufacturing Company of Guelph, Ontario.

Most of the farm buildings were constructed of logs. Some were built of sawn lumber. Shingles were split by hand. Nails were made by the blacksmith. Most of the buildings were painted with a mixture of skim milk and lime. Some were painted with a mixture of linseed oil and lead.

Transportation

Transportation was by horse and wagon. Roads were rough and muddy in the spring and fall. Some were corduroyed with logs. Others were covered with gravel. Bridges were made of logs or sawn lumber.

Communication

Communication was by mail. Letters were delivered by horseback riders. Some were delivered by stage coaches. Mail was carried by train from Peterborough to Lakefield.

Markets

Markets were at Peterborough, Lakefield and Young's Point. Some farmers sold their produce to the lumber camps in the winter. Others sold to the settlers who arrived in the spring.

Prices

Prices were low. Wheat sold for 50¢ - 75¢ a bushel. Oats sold for 15¢ - 25¢ a bushel. Barley sold for 25¢ - 35¢ a bushel. Potatoes sold for 10¢ - 15¢ a bushel. Eggs sold for 5¢ - 10¢ a dozen. Butter sold for 10¢ - 15¢ a pound. Pork sold for 3¢ - 5¢ a pound. Beef sold for 2¢ - 4¢ a pound. Chickens sold for 10¢ - 15¢ a pair. Turkeys sold for 25¢ - 50¢ each. Geese sold for 15¢ - 25¢ each. Ducks sold for 10¢ - 15¢ a pair.

Cash was scarce. Most of the trading was done by barter. Farmers exchanged produce for goods and services.

Settlement

Settlement was rapid. Many settlers arrived in the spring of 1825. Others arrived in the fall of 1825. Some arrived in the spring of 1826. Others arrived in the fall of 1826.

Most of the settlers were from England, Ireland and Scotland. Some were from the United States. Others were from Canada.

Most of the settlers were poor. Some were destitute. Others were well-to-do. Most of the settlers were industrious. Some were lazy. Others were shiftless.

Most of the settlers were healthy. Some were sick. Others were dead. Most of the settlers were married. Some were single. Others were widowed.

Most of the settlers were literate. Some were illiterate. Others were semi-literate.

Most of the settlers were religious. Some were atheistic. Others were agnostic.

Most of the settlers were law-abiding. Some were criminal. Others were outlaws.

Most of the settlers were peaceful. Some were violent. Others were warlike.

Most of the settlers were friendly. Some were hostile. Others were neutral.

Most of the settlers were honest. Some were dishonest. Others were thieves.

Most of the settlers were hard-working. Some were lazy. Others were idle.

Most of the settlers were thrifty. Some were wasteful. Others were spendthrifts.

Most of the settlers were successful. Some were unsuccessful. Others were failures.

Most of the settlers were happy. Some were unhappy. Others were miserable.

Most of the settlers were healthy. Some were sick. Others were dead.

Most of the settlers were married. Some were single. Others were widowed.

Most of the settlers were literate. Some were illiterate. Others were semi-literate.

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Most of the settlers were happy. Some were unhappy. Others were miserable.

Results

Animal responses to pasture treatment are shown in Table 2. The pasture with the seeded spreaders had nearly a three-fold increase in A.U.D.'s per acre over the check pasture. The total gain per acre followed the same pattern as the treated pasture, having nearly a three-fold increase over the check pasture. It is apparent from the data in Table 2 that most of the gain was made during the first month of grazing, particularly in the treated pasture in which there was actually a loss during the last 42 days of grazing. It should be remembered, however, that the shrinkage time for the June 12 weighing was less than for the initial and final weighing, and this would tend to exaggerate to some extent the gain made during the first 31 days. Also of interest in Table 2 is the apparent differential rates of gains between the Angus and Hereford. In both the treated and check pastures the Herefords had a higher average daily rate of gain. The effect of the two previous feed treatments on the weight gains of the steers is shown in Table 3. Animals which had not been fed barley in the earlier study had gains which were 250 percent of those having barley.

The forage production and utilization figures for the two pastures are presented in Tables 4 and 5. There was a slight decrease in production in the seeded areas, as compared to the 1963 production, but it was more than compensated for by the increase in percent utilization. In 1963 utilization in the seeded areas was 29 and 5 percent for Agropyron cristatum and Agropyron elongatum respectively compared to utilization percentages of 90.6 and 89.0 respectively, in 1964. This was due to the fact that the steers were put on the pastures before the grass had reached maturity, and they were able to keep it grazed down. It should also be kept in mind that the production figures do not include any regrowth which was considerable during the early part of the grazing period when moisture was adequate. There was also considerable utilization of willow (Salix spp.), cottonwood (Populus spp.), tamarix (Tamarix spp.), and to some extent silver sagebrush (Artemisia cana) which continue to thrive throughout the spreader system.

There might be a question as to how the steers in the check pasture fared so well with such little utilization of the saltbush. The upper dam which furnishes drinking water for the check pasture has silted in to quite an extent, resulting in a large area (20 plus acres) in the drainage above the dam that acted somewhat like a large spreader. Within this area there was an abundance of cottonwoods, willows, tamrix, and grass - particularly foxtail barley (Hordeum jubatum). Early in the grazing season there was also an abundance of cottonwood seedlings. The steers spent considerable time in this area "shading-up" and feeding. As a result, there was considerable utilization of the vegetation.

Data obtained from the 50-foot vegetation transects for 1962 and 1964 are summarized in Tables 6 through 9. There was a general decrease from 1962 to 1964 in percent cover of the major species and the number of species present with the biggest decrease noted in the crested wheatgrass

TABLE 2. STOCKING RATE AND ANIMAL RESPONSE, NORTH FORK EXPERIMENTAL AREA, 1964

	Treated Pasture			Check Pasture		
	Angus	Hereford	Total or Ave.	Angus	Hereford	Total or Ave.
No. of days grazed	73.0	73.0	73.0	73.0	73.0	73.00
No. of animals	50.0	28.0	78.0	17.0	6.0	26.00
A.U.D.'s per acre*	--	--	10.92	--	--	3.88
Ave. Initial weight	616.3	625.0	620.7	611.6	613.2	612.20
Ave. weight June 12	655.0	661.1	658.0	628.6	654.1	637.40
Ave. final weight	642.4	659.2	650.8	642.2	653.6	647.90
Ave. daily gain per animal						
May 12 - June 12	1.21	1.13	1.17	.53	1.28	.79
June 12 - July 24	- .31	- .05	- .18	.33	- .01	.21
May 12 - July 24	.36	.46	.41	.42	.55	.47
Total lbs.gain per acre	--	--	4.34	--	--	1.81

*A.U.D.'s = animal unit days

TABLE 3. ANIMAL RESPONSE (AVE. LBS. OF GAIN PER STEER) IN THE NORTH FORK EXPERIMENTAL AS AFFECTED BY PREVIOUS FEED TREATMENTS. 1964

Previous feed Treatment	Treated Pasture	Check Pasture
Alfalfa, Silage, and Barley	19.15	16.69
Alfalfa and Silage	49.69	41.23

TABLE 4. PRODUCTION -- POUNDS OF AIR-DRY FORAGE PER ACRE -- ON THE NORTH FORK EXPERIMENTAL AREA, 1964

	Treated Pasture		Check Pasture
Species	Seeded Area	Unaffected Area	
Agropyron cristatum	1104.4		
Agropyron elongatum	261.6		
Poa secunda		P	
Sitanion hystrix	P*	9.6	P
Hordeum jubatum	13.0		
Oryzopsis hymenoides		P	P
Sporobolus cryptandrus		P	5.9
Atriplex nuttallii		371.6	493.8
Artemisia spinescens			P
Annual forbs		12.4	66.9
Perennial forbs		P	6.3

*Present, but less than 5 lbs. per acre

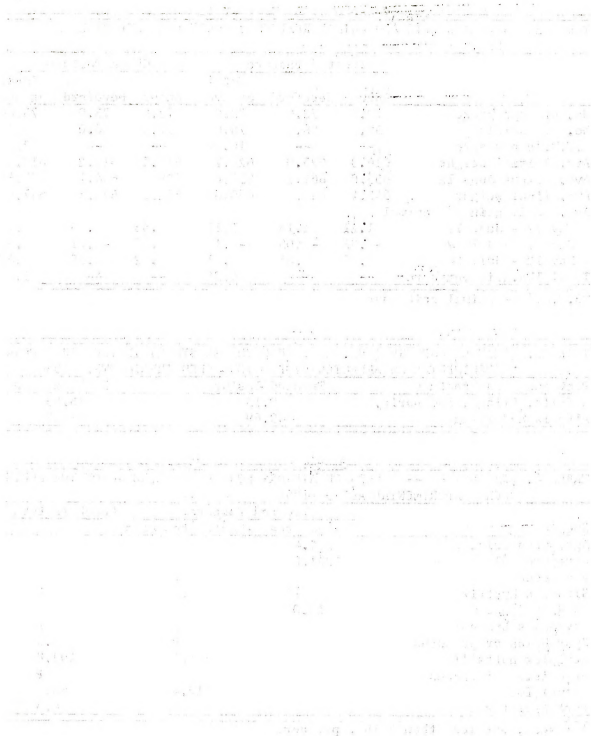


TABLE 5. PERCENTAGE UTILIZATION OF MAJOR SPECIES ON THE NORTH FORK EXPERIMENTAL AREA. 1964

	Treated Pasture		Check Pasture
	Seeded Area	Unaffected Area	
Species	1964	1964	1964
Agropyron cristatum	90.6	--	--
Agropyron elongatum	89.0	--	--
Hordeum jubatum	5.0	--	--
Atriplex nuttallii	77.1	Trace	3.5

TABLE 6. COVER, COMPOSITION, AND FREQUENCY ON CHECK PASTURE OF NORTH FORK EXPERIMENTAL AREA. 1962 and 1964

	% Cover		% Composition		% Frequency	
Species	1962	1964	1962	1964	1962	1964
Atriplex nuttallii	18.70	5.18	59.81	76.80	61.67	29.18
Plantago purshii	1.13	0.27	3.62	4.02	8.33	2.08
Machaeranthera tanacetifolia	6.26	0.50	20.04	7.47	33.67	4.80
Musineon divaricatum	1.33	0.11	4.37	1.54	9.67	1.04
Lappula spp.	0.83	0.08	2.67	1.24	6.33	0.83
Lomation orientale	0.07	--	0.21	--	0.33	--
Halogeton glomeratus	0.33	0.04	1.07	0.62	2.33	0.42
Allium textile	0.30	--	0.53	--	1.67	--
Monolepis nuttallii	0.90	--	2.77	--	6.67	--
Opuntia polyacantha	1.33	0.27	4.26	4.02	3.67	1.67
Lepidium densiflorum	0.03	0.06	0.11	0.93	0.33	0.62
Gilia spp.	0.67	--	0.21	--	0.33	--
Sporobolus cryptandrus	0.03	0.12	0.11	1.85	0.33	1.25
Oryzopsis hymenoides	--	0.04	--	0.62	--	0.42
Misc. Uniden. forbs	--	0.06	--	0.92	--	0.62
Total	31.91	6.73				

TABLE 7. COVER, COMPOSITION, AND FREQUENCY OF UNAFFECTED AREA (NATIVE RANGE) IN SEEDED PASTURE OF NORTH FORK EXPERIMENTAL AREA. 1962 and 1964.

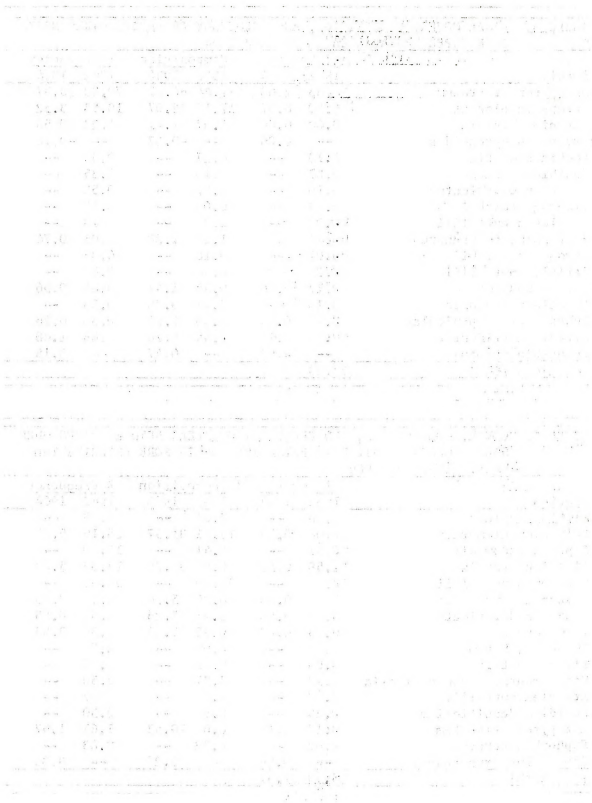
	% Cover		% Composition		% Frequency	
Species	1962	1964	1962	1964	1962	1964
Atriplex nuttallii	9.87	4.47	62.71	90.54	38.00	22.00
Sitanion hystrix	--	0.07	--	1.35	--	0.67
Musineon divaricatum	1.80	0.33	11.44	6.76	11.33	3.33
Euphorbia serpens	--	0.07	--	1.35	--	0.67
Total	11.67	4.91				

TABLE 8. BASAL COVER, COMPOSITION, AND FREQUENCY OF SEEDED DIKES NORTH FORK EXPERIMENTAL AREA. 1962 and 1964

	% Cover		% Composition		% Frequency	
Species	1962	1964	1962	1964	1962	1964
Agropyron cristatum	28.83	2.63	77.44	66.67	70.88	20.37
Agropyron elongatum	6.40	0.87	17.19	22.07	10.53	3.52
Sitanion hystrix	0.40	0.06	1.07	1.41	1.23	0.56
Oryzopsis hymenoides	--	0.06	--	-0.47	--	-0.18
Kochia scoparia	0.10	--	0.27	--	0.53	--
Xanthium commune	0.07	--	0.18	--	0.35	--
Musineon divaricatum	0.10	--	0.27	--	0.53	--
Plantago purshii	0.03	--	0.09	--	0.18	--
Monolepis nuttallii	0.03	--	0.09	--	0.18	--
Sporobolus cryptandrus	0.40	0.07	1.07	1.88	1.05	0.74
Agropyron smithii	0.07	--	0.18	--	0.35	--
Atriplex nuttallii	0.20	0.00	0.54	--	0.88	--
Poa secunda	0.17	0.06	0.45	1.41	0.88	0.56
Opuntia polyacantha	0.10	--	0.27	0.00	0.53	--
Schedonnardus paniculatus	0.13	0.04	0.36	0.94	0.53	0.36
Artemisia tridentata	0.20	0.18	0.54	4.70	0.88	1.48
Euphorbia serpens	--	0.02	--	0.47	--	0.18
Total	37.23	3.99				

TABLE 9. COVER, COMPOSITION, AND FREQUENCY OF AREAS BETWEEN DIKES WHERE SEEDED GRASSES FAILED TO ESTABLISH, NORTH FORK EXPERIMENTAL AREA. 1962 and 1964

	% Cover		% Composition		% Frequency	
Species	1962	1964	1962	1964	1962	1964
Plantago spinescens	1.58	--	6.09	--	10.00	--
Halogeton glomeratus	4.08	0.50	15.71	31.57	25.16	5.00
Lappula redowskii	1.67	--	6.41	--	12.50	--
Sitanion hystrix	1.58	0.58	6.09	38.84	13.33	5.83
Monolepis nuttallii	13.00	--	50.00	--	52.50	--
Oryzopsis hymenoides	0.25	0.08	0.96	5.26	2.50	0.83
Musineon divaricatum	0.83	0.08	3.21	5.26	7.50	0.83
Poa secunda	0.25	0.08	0.96	5.26	2.50	0.83
Hordeum jubatum	0.25	--	0.96	--	2.50	--
Allium textile	0.08	--	0.32	--	0.83	--
Machaeranthera tanacetifolia	1.50	--	5.77	--	7.50	--
Atriplex nuttallii	0.42	--	1.60	--	1.67	--
Lepidium densiflorium	0.25	--	0.96	--	2.50	--
Agropyron cristatum	0.17	0.17	0.64	10.53	1.67	1.67
Euphorbia serpens	0.08	--	0.32	--	0.83	--
Sporobolus cryptandrus	--	0.08	--	5.26	--	0.83
Total	25.99	1.57				



and tall wheatgrass in the seeded dikes. Some of this decrease in percent cover may be due to excess animal activity within the transect area. The steers were attracted by the cages and by the stakes that mark the transects, and as a consequence, there was an excessive amount of trampling. This activity over a period of time would cause lower readings within the transect areas than in the surrounding areas. Perhaps more important is the fact that the 1962 readings were made July 3 just before the steers were placed in the pastures, and the 1964 readings were made in the latter part of July after the steers had been grazing for 70 days or more. At this time the grass had been grazed down to nearly ground level and many of the forbs that would normally have been present had been grazed off or trampled out. While only basal hits were recorded for the grass, it is still possible that there would be a tendency to read more hits on full grown mature grass as was the case in 1962 than on grass which had been grazed until only a short stubble remained.

Despite the fact that several factors may have contributed to the low percent cover reading, it is still apparent that there has been a decrease in the percent cover of the crested wheatgrass and tall wheatgrass in the seeded dikes. Visual estimates of the percent basal cover made while clipping for production and utilization data indicated an average percent cover of about seven to eight percent, a figure somewhat higher than the 2.63 from the point data, but still considerably lower than the 28.83 of 1962.

S E C T I O N III

EXCLOSURE STUDIES (PRODUCTION, COVER, HEIGHT AND PRECIPITATION PHASE)

Vegetation production studies on exclosures and relic areas of the Big Horn and Wind River Basins were initiated during the 1962 field season. Most of the exclosures were constructed in 1959 and 1960. The objectives of the program are to determine:

1. the relationship of annual herbage production to area cover percentage;
2. the relationship of annual herbage production changes to variations in time and amount of available moisture;
3. the relationship of plant height of major forage species to annual herbage production and to time and amount of available moisture;
4. the influence of several range improvement practices on herbage production, area cover, and plant height;
5. the relationship of percentage frequency to area cover and herbage production.

Methods and Procedures

Area cover, herbage production, and height data studies on sagebrush-grass sites were conducted on transects of 20 quadrats, 12 in. sq., spaced systematically along a randomly located 100 ft. steel tape. On sites dominated by saltsage, data were obtained in like manner except that plot size was 1 x 10 ft. The plot frame was placed at right angles to the steel tape and vegetation data were subdivided into ten subplots.

Area cover of herbaceous and low growing semi-woody species was estimated within each square foot plot. Shrub crown cover, including that of pricklypear cactus and phlox, was estimated within the square foot plots, but these data were not combined when comparing area cover to forage production.

Forage production was determined by clipping herbaceous species at ground or crown level. Clippings were oven-dried at 70° C for 24 hours prior to weighing. Exclosures were clipped on or near the same date as the previous years.

Leaf height data were recorded only for the more important species. These were measured on a metric basis and will be correlated with weight and precipitation data in future years.

Precipitation data were recorded from simple aluminum rain gauges installed at each exclosure. Precipitation data were recorded four times a year - April 15, July 1, September 1, and October 15.

Metal stakes were driven into the ground for permanent photo location points in the area where production studies are being conducted in each exclosure.

Names of plants which occurred in the production study areas are shown in Table 1. Included are the four letter code names by which the plants are identified in the tabular material; genus, species, and common names, and life form and characteristic longevity of the plants.

1964 Results

A list, by counties, of production study areas is presented in Table 2. General locations of exclosures are shown on the two maps on the following page (Figure 1). The 29 major study areas in many cases include different range improvement practices. The Shoshoni Ant Study Area, which was established in 1964, includes six exclosures. Four transects of ten plots each were clipped in each exclosure.

The tabular data of production, cover, height, frequency, and precipitation are arranged alphabetically by exclosure or study area name.

TABLE I. LIST OF PLANT NAMES WHICH OCCURRED IN PRODUCTION STUDY AREAS

Code	Genus	Species	Common	Life Form	Longevity
ACLA	Achillea	lanulosa	Yarrow	Forb	Perennial
AGCR	Agropyron	cristatum	Crested Wheatgrass	Grass	Perennial
AGSM	Agropyron	smithii	Western Wheatgrass	Grass	Perennial
AGSP	Agropyron	spicatum	Bluebunch Wheatgrass	Grass	Perennial
AGSU	Agropyron	subsecundum	Bearded Wheatgrass	Grass	Perennial
ALTE	Allium	textile	Textile Onion	Forb	Perennial
ANDI	Antennaria	dimorpha	Low Pussytoe	Forb	Perennial
ANT	Antennaria spp.		Pussytoes	Forb	Perennial
ANOC	Androsace	occidentalis	Fairy Candelabra	Forb	Annual
ARA	Arabis spp.		Rockcresses	Forb	Perennial
ARHO	Arenaria	hookeri	Hooker Sandwort	Forb	Perennial
ARFR	Artemisia	frigida	Fringed Sagewort	Half Shrub	Perennial
ARLU	Artemisia	ludoviciana	White Sagewort	Forb	Perennial
ARNO	Artemisia	nova	Black Sagebrush	Shrub	Perennial
ARPE	Artemisia	petatifida	Brown Sagebrush	Half Shrub	Perennial
ARSP	Artemisia	spinescens	Bud Sagebrush	Half Shrub	Perennial
ARTR	Artemisia	tridentata	Big Sagebrush	Shrub	Perennial
ASCA	Aster	canescens	Hoary Aster	Forb	Perennial
AST	Astragalus spp.		Milkvetches	Forb	Perennial
ATAR	Atriplex	argentea	Silverscale Saltbush	Forb	Annual
ATNU	Atriplex	nuttallii	Nuttall Saltbush	Half Shrub	Perennial
BOGR	Bouteloua	gracilis	Blue Grama	Grass	Perennial
BRJA	Bromus	japonicus	Japanese Chess	Grass	Annual
BRTE	Bromus	tectorum	Cheatgrass Brome	Grass	Annual
CAEL	Carex	eleocharis	Needleleaf Sedge	Sedge	Perennial
CAFI	Carex	filifolia	Threadleaf Sedge	Sedge	Perennial
CALA	Calamagrostis	montanensis	Plains Reedgrass	Grass	Perennial
CAMI	Camelina	microcarpa	Littlepod Falseflax	Forb	Annual
CANU	Calochortus	nuttallii	Mariposa Lily	Forb	Perennial
CARO	Campanula	rotundifolia	Bluebell	Forb	Perennial
CAS	Castilleja spp.		Paintbrushes	Forb	Perennial
CHE	Chenopodiaceae Family		Goosefoot Family		
CHAL	Chenopodium	album	Lambsquarters goosefoot	Forb	Annual
CHLA	Chenopodium	lanceolatum	Goosefoot	Forb	Annual
CHNA	Chrysothamnus	nauseosus	Rubber Rabbitbrush	Shrub	Perennial
CHVI	Chrysothamnus	viscidiflorus	Green Rabbitbrush	Shrub	Perennial
CLLU	Cleome	lutea	Yellow Spiderflower	Forb	Annual
COPA	Commandra	pallida	False Toadflax	Forb	Perennial
CRAC	Crepis	acuminatus	Tapertip Hawksbeard	Forb	Perennial
CYLO	Cymopteris	longipes	Chimaya	Forb	Perennial
DEBI	Delphinium	bicolor	Low Larkspur	Forb	Perennial
DEPI	Descurania	pinnata	Pinnate Tansymustard	Forb	Annual
DES	Descurania spp.		Tansymustards	Forb	
DRA	Draba spp.			Forb	Perennial
EQU	Equisetum spp.		Horsetails	Horsetail	Perennial
ERI	Erigeron spp.		Fleabanes	Forb	Perennial
EREF	Eriogonum	effusum	Spreading Eriogonum	Forb	Perennial

TABLE I. LIST OF PLANT NAMES WHICH OCCURRED IN PRODUCTION STUDY AREAS (CONTINUED)

Code	Genus	Species	Common	Life Form	Longevity
EROV	Eriogonum	ovalifolium	Cushion Eriogonum	Forb	Perennial
ERSU	Eriogonum	subalpinum	Subalpine Eriogonum	Forb	Perennial
ERPU	Erigeron	pumilus	Fleabane	Forb	Perennial
EULA	Eurotia	lanata	Winterfat	Half Shrub	Perennial
EUSE	Euphorbia	serphyllifolia	Thymeleaved Spurge	Forb	Annual
FEID	Festuca	idahoensis	Idaho Fescue	Grass	Perennial
FEOC	Festuca	octoflora	Sixweek Fescue	Grass	Annual
FROV	Fragaria	ovalis	Wild Strawberry	Forb	Perennial
GABO	Galium	boreale	Northern Bedstraw	Forb	Perennial
GILE	Gilia	leptomeria	Gilia	Forb	Annual
GIPU	Gilia	pumila	Gilia	Forb	Annual
GLLE	Glycyrrhiza	lepidota	American Licorice	Forb	Perennial
GRSQ	Grindelia	squarrosa	Curlycup Gumweed	Forb	Biennial
GUSA	Gutierrezia	sarothrae	Broom Snakeweed	Half Shrub	Perennial
HAGL	Halogeton	glomeratus	Halogeton	Forb	Annual
HEPE	Helianthus	petiolaris	Prairie Sunflower	Forb	Annual
HOPU	Hordeum	pusillum	Little Barley	Grass	
HYAC	Hymenoxys	acaulis	Stemless Hymenoxys	Forb	Perennial
HYGR	Hymenoxys	grandiflora		Forb	Perennial
IRMI	Iris	missourinsis	Rocky Mountain Iris	Forb	Perennial
JUCO	Juniperus	communis	Common Juniper	Shrub	Perennial
JUSC	Juniperus	scopulorum	Rocky Mountain Juniper	Shrub	Perennial
JUN	Juncus spp.		Rushes	Rush	Perennial
KOCR	Koeleria	cristata	Junegrass	Grass	Perennial
KOSC	Kochia	scoparia	Belvedere Summer Cyprus	Forb	Annual
LAC	Lactuca spp.		Lettuces	Forb	Annual
LARE	Lappula	redowskii	Stickseed	Forb	Annual
LATE	Lappula	texana	Stickseed	Forb	Annual
LEDE	Lepidium	densiflorum	Prairie Pepperweed	Forb	Annual
LEPE	Lepidium	perfoliatum	Clasping Pepperweed	Forb	Annual
LEPU	Leptodactylon	pungens	Granite Gilia	Forb	Perennial
LUP	Lupinus spp.		Lupines	Forb	Annual
MATA	Machaeranthera	tanacetifolia	Tansyleaf Aster	Forb	Annual
MER	Mertensia spp.		Bluebells	Forb	Perennial
MONU	Monolepis	nuttalliana	Nuttall Monolepis	Forb	Annual
MUDI	Musineon	divaricatum	Falsecarrot	Forb	Perennial
OEAL	Oenothera	albicaulis	Pale Eveningprimrose	Forb	Perennial
OECA	Oenothera	caespitosa	Tufted Eveningprimrose	Forb	Perennial
OPPO	Opuntia	polyacantha	Plains Pricklypear	Forb	Perennial
ORHY	Oryzopsis	hymenoides	Indian Ricegrass	Grass	Perennial
ORLU	Orthocarpus	luteus	Owlclover	Forb	Annual
PEN	Penstemon spp.		Penstemons	Forb	Perennial
PHL	Phleum spp.		Timothys	Grass	Perennial
PHHO	Phlox	hoodii	Hood's Phlox	Forb	Perennial
PIFL	Pinus	flexilis	Limber Pine	Tree	Perennial
PLPU	Plantago	purshii	Wooly Indianwheat	Forb	Annual

TABLE I. LIST OF PLANT NAMES WHICH OCCURRED IN PRODUCTION STUDY AREAS (CONTINUED)

Code	Genus	Species	Common	Life Form	Longevity
PLSP	Plantago	spinescens	Spiny Indianwheat	Forb	Annual
POA	Poa spp.		Bluegrasses	Grass	Perennial
POFE	Poa	fendleriana	Muttongrass	Grass	Perennial
POSE	Poa	secunda	Sandberg Bluegrass	Grass	Perennial
POT	Potentilla spp.		Cinquefoil	Forb	Perennial
PSTA	Pseudotsuga	taxifolia	Douglas Fir	Tree	Perennial
RIB	Ribes spp.		Gooseberries	Shrub	Perennial
SAKA	Salsola	kali	Russian Thistle	Forb	Annual
SAVE	Sarcobatus	vermiculatus	Greasewood	Shrub	Perennial
SEDE	Selaginella	densa	Clubmoss	Clubmoss	Perennial
SIHY	Sitanion	hystrix	Squirreltail Bottlebrush	Grass	Perennial
SIS	Sisymbrium spp.		Tumblemustards	Forb	
SMI	Smilacina spp.		Solomonseal	Forb	Perennial
SPCO	Sphaeralcea	coccinea	Scarlet Globemallow	Forb	Perennial
SPAI	Sporobolus	airoides	Alkali sacaton	Grass	Perennial
SPCR	Sporobolus	cryptandrus	Sand Dropseed	Grass	Perennial
STA	Stanleya spp.		Princessplumes	Forb	
STCO	Stipa	comata	Needleandthread	Grass	Perennial
STVI	Stipa	viridula	Green Needlegrass	Grass	Perennial
SYM	Symphoricarpos spp.		Snowberries	Shrub	Perennial
TAOF	Taraxacum	officinale	Common Dandelion	Forb	Perennial
TECA	Tetradymia	canescens	Gray Horsebrush	Shrub	Perennial
TESP	Tetradymia	spinosa	Cottonthorn Horsebrush	Shrub	Perennial
TRI	Trifolium spp.		Clovers	Forb	
UMB	Umbelliferae Family		Carrot Family		
URT	Urtica spp.		Nettles	Forb	Perennial

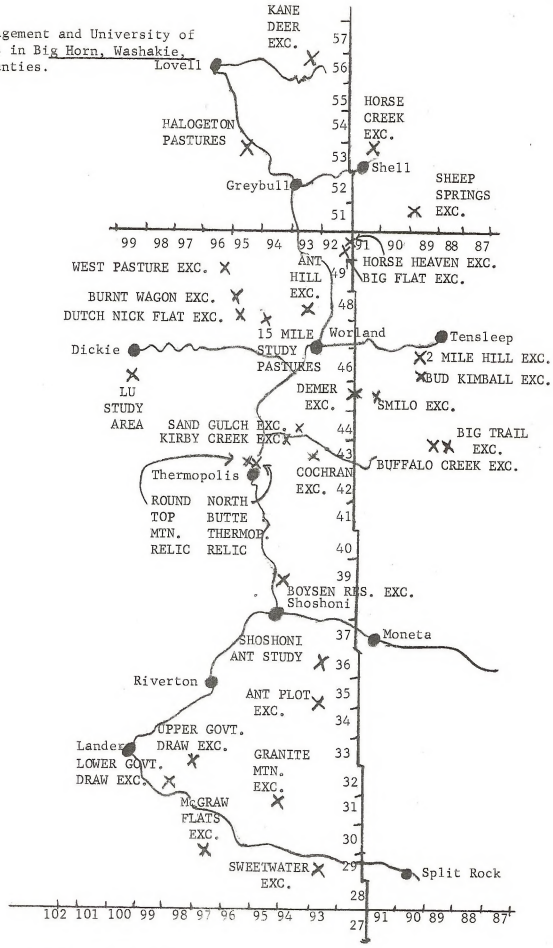
TABLE II. LIST OF PRODUCTION STUDY AREAS

	1962	1963	1964
Washakie County			
Buffalo Creek Exclosure	x	x	x
Burnt Wagon Exclosure		x	x
Demer Exclosure	x	x	x
Dutch Nick Flat Exclosure		x	x
West Pasture Exclosure		x	x
Bud Kimball Exclosure - Native	x	x	x
Bud Kimball Exclosure - Sprayed	x	x	x
Smilo Exclosure - Native	x	x	x
Smilo Exclosure - Sprayed	x	x	x
Two Mile Hill Exclosure - Native	x	x	x
Two Mile Hill Exclosure - Seeded	x		
Two Mile Hill Exclosure - Pitted	x		
Hot Springs County			
Cochran Exclosure - Native	x	x	x
Cochran Exclosure - Sprayed	x	x	x
Cochran Exclosure - Pitted	x		
Kirby Creek Exclosure	x	x	x
North Butte - Thermopolis Relic	x	x	x
Round Top Mountain Relic	x	x	x
Sand Gulch - Native	x	x	x
Sand Gulch - Seeded	x		
Big Horn County			
Halogeton Exclosure #1		x	x
Halogeton Exclosure #2		x	x
Halogeton Exclosure #3		x	x
Horse Creek - AGSP Type	x	x	x
Horse Creek - AGSM Type	x	x	x
Kane Deer Exclosure			x

TABLE II. Continued

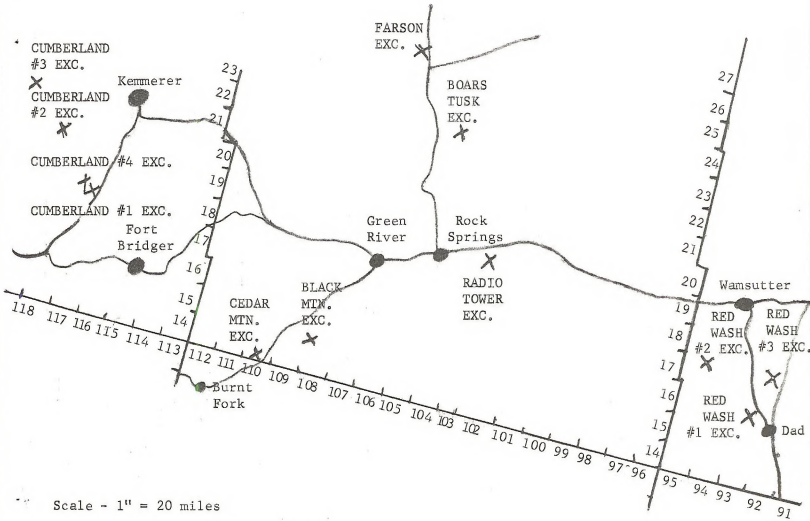
	1962	1963	1964
Fremont County			
Ant Hill Lander	x	x	x
Boysen	x	x	x
Lower Gov't Draw - No Spray - Inside	x	x	x
Lower Gov't Draw - No Spray - Outside	x		
Lower Gov't Draw - No Spray - Seeded	x		
Lower Gov't Draw - Spray - Inside	x	x	x
Lower Gov't Draw - Spray - Outside	x		
Lower Gov't Draw - Spray - Seeded	x		
Lower Gov't Draw - Spray - Pitted	x		
McGraw Flat	x	x	x
Sweetwater	x	x	x
Upper Gov't Draw - No Spray - Inside	x	x	x
Upper Gov't Draw - No Spray - Outside	x		
Upper Gov't Draw - No Spray - Seeded	x		
Upper Gov't Draw - No Spray - Pitted	x		
Upper Gov't Draw - Spray - Inside	x	x	x
Upper Gov't Draw - Spray - Outside	x		
Upper Gov't Draw - Spray - Seeded	x		
Upper Gov't Draw - Spray - Pitted	x		
Granite Mountain - No Spray		x	x
Granite Mountain - Spray		x	x
Shoshoni Ant #2			x
Shoshoni Ant #4			x
Shoshoni Ant #7			x
Shoshoni Ant #8			x
Shoshoni Ant #9			x
Shoshoni Ant #11			x
Sweetwater County			
Farson	x	x	x
Uinta County			
Cumberland #1 - No Spray		x	x
Cumberland #1 - Spray		x	x
Cumberland #4		x	x
Lincoln County			
Cumberland #2 - No Spray		x	x
Cumberland #2 - Spray		x	x
Cumberland #3 - No Spray		x	x
Cumberland #3 - Spray		x	x

Bureau of Land Management and University of Wyoming Study Sites in Big Horn, Washakie, and Hot Springs Counties.



Scale - 1" = 20 miles

Bureau of Land Management and University of Wyoming Study Sites in Sweetwater, Carbon, Uinta, and Lincoln Counties.



Scale - 1" = 20 miles

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Ant Eradication Exc. Riverton 8/21/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency Percent Base 20	Total Weight Gms/20 sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	179.0	8.95	-		15				
AGSM	30.5	1.53	40.0		19	51.04	2.69	1.67	244.99
POSE	21.0	1.05	28.0		12	5.45	.45	.26	26.16
STCO	11.0	0.55	14.0		4	18.67	4.67	1.70	89.62
BOGR	1.0	0.05	1.0		1	.84	.84	.84	4.00
ORHY	2.0	0.10	3.0		1	6.85	6.85	3.43	32.88
ANNUAL FORBS	7.0	0.37	10.0		14	.38	.03	2.00	1.82
DEPI	1.5	0.08	2.0		3				
PLPU	4.5	0.23	6.0		9				
CHAL	0.5	0.03	1.0		1				
LUP SPP.	0.5	0.03	1.0		1				
PERENNIAL FORBS	3.0	0.15	4.0		11	.38	.03	3.67	1.82
SPCO	2.0	0.10	3.0		4				
ALTE	1.0	0.05	1.0		2				
*PHHO	1.5	0.08			2				
*OPPO	67.0	3.35			3				
TOTAL		3.80				83.61			401.29

* Not computed in percent composition

Precipitation Data:

R. G. #3 Ant Eradication Exc. Riverton

October 15 to April 15 - 4.05
April 15 to July 1 - 4.18
July 1 to September 1 - 0.21
September 1 to October 15 - 0.40
Season Total - 8.84

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Boysen 7/30/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occur-rences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
BOGR	201.05	10.05	95.18	7.15	18	53.46	2.97	..27	256.61
SPCR	8.00	.40	3.79	11.00	2	1.59	.80	.20	7.63
ANNUAL FORBS	.90	.05	.46		16	.17	.01	.02	.82
AST. SP.	.55	.03	.28		11				
SAKA	.05	T	T		1				
GIPU	.15	.01	.09		3				
UNK.	.15	.01	.09		1				
PERENNIAL FORBS	1.25	.06	.57		6	3.91	.65	3.13	18.77
SPCO	1.25	.06	.57		6				
*OPPO	87.00	4.35			4				
TOTAL		10.56				59.13			283.83

* Not computed in percent composition

Precipitation Data:

R. G. #10 - Boysen

October 15 to April 15	= .20
April 15 to July 1	= 4.12
July 1 to September 1	= .10
September 1 to October 15	= .10
Season Total	= 4.52
Long Term Average	= 4.76

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Bud Kimball Exclosure Non-spray 7/20/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight GMS/20 /sq.ft.	Average Weight Per Plot Occur-rences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	145.5	7.28	-		11				
AGSM	25.0	1.50	20.29	18.75	19	15.08	.79	.60	72.38
POSE	100.5	5.03	68.07	6.75	18	14.89	.83	.15	71.47
ANNUAL FORBS	17.0	.86	11.64		29	1.63	.06	.10	7.82
PLSP	7.5	.38	5.14		13				
LEDE	3.0	.15	2.03		3				
DEPI	2.0	.10	1.35		4				
LATE	1.0	.05	.68		2				
GIPU	2.5	.13	1.76		5				
LEP SPP.	1.0	.05	.68		2				
*OPPO	35.0	1.75	-		4				
*PHHO	4.0	.20	-		2				
TOTAL		7.39				31.60			151.67

*Not computed in percent composition

Precipitation Data:

R. G. #41 ' Bud Kimball Exclosure

October 15 to April 15	- 3.56	September 1 to October 15	- 1.03
April 15 to July 1	-	Season Total	-10.65
July 1 to September 1	- 6.06		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 20

Cover Determined by Area Estimate -

Bud Kimball Exclosure Sprayed 7/20/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency Percent Base 20	Total Weight Gms/20 /sq.ft.	Average Weight per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds per Acre
	A	B	C	D	E	F	G	H	I
*ARTR	.5	.03	-		1				
AGSM	36.0	1.80	24.23	30	20	70.88	3.54	1.97	340.22
POSE	84.5	4.23	56.93	9	19	19.30	1.01	.23	92.64
BOGR	5.0	.25	3.36	4	1	1.01	1.01	.20	4.85
SIHY	10.0	.50	6.73	11	3	11.39	3.80	1.14	54.67
STCO	1.0	.05	.67	50	1	3.60	3.60	3.60	17.28
FEOC	.5	.03	.40		1	.02	.02	.01	.10
ANNUAL FORBS	11.0	.57	7.68		19	1.50	.08	.14	7.20
LATE	2.5	.13	1.75		4				
LEDE	1.5	.08	1.08		3				
MUDI	.5	.03	.40		1				
DEPI	3.0	.15	2.02		4				
GIPU	2.0	.10	1.35		4				
PLSP	1.5	.08	1.08		3				
*PHHO	14.0	.70	-		4				
*OPPO	70.0	3.50	-		5				
TOTAL		7.43				107.70			516.96

* Not computed in Percent Composition

Precipitation Data:

R. G. #41 Bud Kimball Exclosure

October 15 to April 15	- 3.56	September 1 to October 15	- 1.03
April 15 to July 1	-	Season Total	-10.65
July 1 to September 1	- 6.06		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 Plot No. 20

Cover Determined by Area Estimate

Buffalo Exclosure 7-28-64	Total Trans. Basal Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 200	Total Weight Gms/20 /sq.ft.	Average Weight per plot Occurrences F ÷ E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	89.5	4.48			9				
AGSM	16.0	.80	8.33	22.2	15	12.78	.85	.80	61.34
AGSP	69.0	3.45	35.95	26.1	17	54.23	3.19	.79	260.30
POSE	53.0	2.65	27.61	3.4	15	14.24	.95	.27	68.35
BOGR	10.0	.50	5.21	2.5	4	1.93	.48	.19	9.26
BRTE	5.0	.25	2.60	11.3	6	2.34	.39	.47	11.23
FEOC	.5	.03	0.31		1	.01	.01	.02	.05
ANNUAL FORBS	26.5	1.36	14.16		49	22.24	.45	.84	106.75
PLSP	8.5	.43	4.48		14				
PLPU	1.0	.05	0.52		2				
LEDE	6.0	.30	3.13		12				
LATE	5.5	.28	2.92		11				
SAKA	1.5	.08	.83		3				
MUDI	1.5	.08	.83		3				
DEPI	.5	.03	.31		1				
CHAL	.5	.03	.31		1				
MATA	.5	.03	.31		1				
AST SP.	1.0	.05	.52		1				
PERENNIAL FORBS	2.0	.11	1.14		4	2.07	.52	1.04	9.90
ALTE	1.0	.05	.52		2				
SPCO	.5	.03	.31		1				
CAL SP.	.5	.03	.31		1				
*OPPO	9.0	.45	4.69		2				
*PHHO	10.5	.53			5				
TOTAL		9.60				109.84			527.18

* Not computed in percent Composition

Precipitation Data:

R. G. #63 - Buffalo Exclosure

October 15 to April 15	- 4.55	Season Total	- 10.27
April 15 to July 1	- 4.92	Long Term Average	- 11.89
July 1 to September 1	- 0.65		
September 1 to October 15	- 0.15		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimates

Burnt Wagon Exc. 7/8/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base200	Total Weight Gms/200 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
ATNU	2042.5	10.21	93.17		95	1042.40	10.97	.51	500.35
SIHY	36.5	.18	1.64		24	46.89	1.95	1.28	22.51
ANNUAL FORBS	100.5	.51	4.64		158	14.47	.09	.14	6.95
MUDI	48.0	.24	2.19		67				
EUSE	4.5	.02	.18		9				
MONU	33.0	.17	1.55		60				
MATA	6.0	.03	.27		9				
OECA	7.5	.04	.36		10				
LEDE	1.5	.01	.09		3				
PERENNIAL FORBS	12.5	.06	.55		20	38.67	1.93	.31	18.56
ALTE	12.5	.06	.55		20				
TOTAL		10.96				1142.43			548.37

Precipitation Data:

R. G. #17 Burnt Wagon

October 15 to April 15	- 1.30	September 1 to October 15	- .00
April 15 to July 1	- 4.63	Season Total	-- 6.27
July 1 to September 1	- .34		

HERBAGE AND PRECIPITATION DATA FROM WYOMING GALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — Plot No. 20

Cover Determined by Area Estimate

Cochran Exclosure Non-Spray 7/28/64	Total Trans. Basal Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 200	Total Weight Gms/20 /sq.ft.	Average Weight per plot Occurrences F ÷ E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	317.5	15.88	-	-	19	-	-	-	-
AGSM	33.5	1.68	41.2	29.6	18	31.53	1.75	.94	151.34
BRTE	4.0	.20	4.9	16.3	3	1.34	.45	.34	6.43
POSE	34.0	1.70	41.5	7.7	14	3.61	.26	.11	17.33
FEOC	1.5	.08	2.0	5.5	3	.17	.06	.11	.82
ANNUAL FORBS	9.5	.43	10.4	-	19	1.42	.07	.15	6.82
PLPU	0.5	T	T	-	1	-	-	-	--
PLSP	5.5	.28	6.8	-	11	-	-	-	-
CHAL	2.0	.10	2.4	-	4	-	-	-	-
DEPI	0.5	T	T	-	1	-	-	-	-
LEDE	1.0	.05	1.2	-	2	-	-	-	-
PERENNIAL FORBS	0.5	T	T	-	2	.20	.20	.40	.96
ALTE	0.5	T	T	-	1	-	-	-	-
*OPPO	3.0	.15	-	-	1	-	-	-	-
*PHHO	0.5	T	-	-	1	-	-	-	--
TOTAL		4.09				38.27			183.70

* Not computed in percent cover.

Precipitation Data;

R. G. #73 - Cochran Exclosure

October 15 to April 15	- 3.55
April 15 to July 1	- 7.41
July 1 to September 1	- 0.30
September 1 to October 15	- 0.03
Season Total	- 11.34
Long Term Average	- 11.14

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — Plot No. 20

Cover Determined by Area Estimate

Cochran Exclosure Sprayed 7-28-64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq. ft.	Average Weight per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre Fx. 4.8
	A	B	C	D	E	F	G	H	I
*ARTR 1/	221.0	11.10	-	-	17.0	-	-	-	-
AGSM	54.0	2.70	45.0	36.5	19.0	64.23	3.38	1.19	308.30
POSE	43.0	2.15	36.0	11.4	12.0	7.34	.61	.01	35.23
BOGR	10.0	0.50	8.0	8.0	2.0	4.02	2.01	.20	19.30
FEOC	0.5	T	T	-	1.0	.19	.19	.38	.91
BRTE	2.5	0.13	2.0	10.4	5.0	1.32	.26	.10	6.33
ANNUAL FORBS	10.5	0.51	9.0	-	21.0	2.02	.09	.01	9.69
CHAL	3.5	0.18	3.0	-	7.0	-	-	-	-
LEDE	1.0	0.05	1.0	-	2.0	-	-	-	-
DEPI	1.0	0.05	1.0	-	2.0	-	-	-	-
PLSP	4.5	0.23	4.0	-	9.0	-	-	-	-
LATE	0.5	T	T	-	1.0	-	-	-	-
PERENNIAL FORBS	1.0	T	T	-	2.0	.63	.31	.31	3.07
ALTE	0.5	T	T	-	1.0	-	-	-	-
CAL SP.	0.5	T	T	-	1.0	-	-	-	-
PHHO*	7.0	0.35	-	-	1.0	-	-	-	-
OPPO*	18.0	0.90	-	-	1.0	-	-	-	-
TOTAL		5.99				79.75			382.83

1/ Numerous scattered seedlings noted
*Not computed in Percent Composition

Precipitation Data:

R. G. #73 - Cochran Exclosure

October 15 to April 15	- 3.55
April 15 to July 1	- 7.41
July 1 to September 1	- 0.30
September 1 to October 15	- 0.08
Season Total	-11.34
Long Term Average	-11.14

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #1 Non-Spray 8/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	18.00	.90	--		1				
*SAVE	118.00	5.90	--		6				
*CHVI	27.50	1.38	--		7				
*ATAR	.50	.30	--		1				
ATNU	13.00	.65	19.06		2	10.58	5.29	.81	50.78
AGSM	22.00	1.10	32.26		15	25.66	1.71	1.17	123.17
POSE	5.00	.25	7.33		3	4.28	1.43	.86	20.54
SIHY	2.00	.10	2.93		1	1.85	1.85	.93	8.88
ORHY	17.50	.88	25.81		6	10.76	1.79	.61	51.65
ANNUAL FORBS	8.50	.43	12.61		13	8.76	.67	1.03	42.05
DEPI	2.00	.10	2.93		3				
GIPU	.50	.03	.88		1				
MONU	4.00	.20	5.87		6				
LATE	2.00	.10	2.93		3				
*PHHO	4.50	.23	--		5				
TOTALS		3.41				61.89			297.07

*Not computed in percent composition

Precipitation Data:

R. G. #31 Cumberland #1

October 15 to April 15	- 2.32	September 1 to October 15	- .03
April 15 to July 1	- 4.77	Season Total	- 8.14
July 1 to September 1	- 1.02		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #1 Sprayed 8/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	228.00	11.40	--		10				
*CHVI	35.00	1.75	--		8				
*SAVE	35.50	1.78	--		3				
ATNU	3.00	.15	10.64		1	6.71	6.71	2.24	32.20
AGSM	10.00	.50	35.45		13	6.12	.47	.61	29.38
POSE	12.00	.60	42.55		8	14.94	1.87	1.25	71.71
ANNUAL FORBS	3.00	.16	11.36		6	.07	.01	.02	.34
DEPI	.50	.03	2.13		1				
MONU	1.00	.05	3.55		2				
LATE	.50	.03	2.13		1				
UNK.	1.00	.05	3.55		2				
TOTALS		1.41				27.84			133.63

*Not computed in percent composition

Precipitation Data:

R. G. #31 Cumberland #1

October 15 to April 15	- 2.32	September 1 to October 15	- .03
April 15 to July 1	- 4.77	Season Total	- 8.14
July 1 to September 1	- 1.02		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #2 Non-Spray 8/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	237.00	11.85	--		14				
*CHVI	27.00	1.35	--		5				
*TECA	18.00	.90	--		1				
AGSM	18.50	.93	14.72		15	16.61	1.11	.90	79.73
POSE	54.00	2.70	42.72		11	33.49	3.04	.62	160.75
ANNUAL FORBS	53.00	2.66	42.09		22	6.58	.30	.12	31.58
COPA	6.50	.33	5.22		7				
ERSU	34.00	1.70	26.90		8				
ERI SPP.	11.50	.58	9.18		5				
UNK.	1.00	.05	.79		2				
PERENNIAL FORBS	.50	.03	.47		1	.02	.02	.01	.10
UNK.	.50	.03	.47		1				
*PHHO	8.00	.40	--		1				
TOTALS		6.32				56.70			272.16

*Not computed in percent composition

Precipitation Data:

R. G. #32 Cumberland #2

October 15 to April 15	- N.R.	September 1 to October 15	- .00
April 15 to July 1	- 7.27	Season Total	- 7.91
July 1 to September 1	- .64		

N.R. = Not Read

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #2 Sprayed 8/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	134.50	6.73	--		9				
*CHVI	32.50	1.63	--		10				
AGSM	18.00	.90	29.22		18	17.48	.97	.97	83.90
POSE	29.00	1.45	47.08		11	15.08	1.37	.52	72.38
ANNUAL									
FORBS	14.50	.73	23.70		7	.30	.04	.01	1.44
ERSU	14.00	.70	22.73		6				
UNK.	.50	.03	.97		1				
*PHHO	1.00	.05	--		1				
TOTALS		3.08				32.86			157.72

*Not computed in percent composition

Precipitation Data:

R. G. #32 Cumberland #2

October 15 to April 15	- N.R.	September 1 to October 15	- .00
April 15 to July 1	- 7.27	Season Total	- 7.91
July 1 to September 1	- .64		

N.R. = Not read

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #3 Non-Spray 8/15/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	590.00	29.50	--		15				
*CHVI	24.00	1.20	--		12				
AGSM	13.50	.68	26.15		10	12.21	1.22	.90	58.61
AGSP	14.50	.73	28.10		6	12.82	2.14	.88	61.54
SIHY	.50	.03	1.15		1	.05	.05	.10	.24
POSE	17.00	.85	32.69		11	7.71	.70	.45	37.01
ANNUAL FORBS	5.00	.26	9.99		6	.78	.13	.16	3.74
ERSU	3.00	.15	5.77		2				
TRI. SPP.	.50	.03	1.15		1				
UNK. #1	.50	.03	1.15		1				
UNK. #2	1.00	.05	1.92		2				
PERENNIAL FORBS	1.00	.05	1.92		1	.80	.80	.80	3.84
ASTR.SPP.	1.00	.05	1.92		1				
*PHHO	39.00	1.95	--		9				
TOTALS		2.60				34.37			164.98

*Not competed in percent composition

Precipitation Data:

R. G #33 Cumberland #3

October 15 to April 15	- 3.57	September 1 to October 15	- .02
April 15 to July 1	- 4.80	Season Total	- 8.76
July 1 to September 1	- .37		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #3 Sprayed 8/15/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	128.00	6.40	--		14				
*CHVI	60.50	3.03	--		19				
AGSM	15 50	.78	37.14		15	10.53	.70	.68	50.54
POSE	19.50	.98	46.70		7	3.64	.52	.19	17.47
ANNUAL									
FORBS	1.90	.29	13.78		5	.35	.07	.18	1.68
DEPI	.50	.03	1.42		1				
ERSU	4.00	.20	9.52		2				
UNK. #1	.50	.03	1.42		1				
UNK. #2	.50	.03	1.42		1				
PERENNIAL									
FORBS	1.00	.05	2.38		1	.06	.06	.06	.29
ASTR. SPP.	1.00	.05	2.38		1				
*PHHO	2.00	.10	--		1				
TOTALS		2.10				14.58			69.98

*Not computed in percent composition

Precipitation Data:

R. G. #33 Cumberland #3

October 15 to April 15	- 3.57	September 1 to October 15	- .02
April 15 to July 1	- 4.80	Season Total	- 8.76
July 1 to September 1	- .37		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Cumberland #4 8/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARNO	1.00	.05	--		1				
*TESP	2.00	.10	--		1				
ATNU	154.00	7.70	82.00		8	75.75	9.47	.49	363.60
AGSM	.50	.03	.32		1	.08	.08	.01	.38
POSE	1.00	.05	.53		1	.16	.16	.16	.77
ANNUAL									
FORBS	32.00	1.61	17.15		25	4.92	.20	.15	23.62
EULA	19.00	.95	10.12		4				
MONU	4.50	.23	2.45		7				
DEPI	3.00	.15	1.60		5				
LATE	3.00	.15	1.60		5				
SYS. SPP.	2.50	.13	1.38		4				
*PHHO	7.00	.35	--		4				
TOTALS		9.39				80.91			388.37

*Not computed in percent composition

Precipitation Data:

R. G. #34 Cumberland #4

October 15 to April 15	- 2.22	September 1 to October 15	- .00
April 15 to July 1	- 4.11	Season Total	- 7.26
July 1 to September 1	- .93		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 Plot No. 20

Cover Determined by Area Estimate

Demer Exclosure 7-27-64	Total Trans. Basal Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 20	Total Weight Gms/20 /sq.ft.	Average Weight per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
ARTR	297.0	14.9			11				
AGSM	12.0	0.6	6.06	22.1	9	7.88	.88	.66	37.82
POSE	40.5	2.0	20.20	13.1	15	8.61	.57	.21	41.33
BOGR	98.5	4.9	49.50	14.2	12	14.55	1.21	.15	69.84
FEOC	7.0	0.4	4.04	2.4	14	1.69	.12	.24	8.11
SIHY	3.0	0.2	2.02	16.5	2	1.12	.56	.37	5.38
BRTE	4.0	0.2	2.02	10.1	8	1.04	.13	.26	4.99
ANNUAL FORBS	17.0	1.6	16.16		30	6.73	.22	.40	27.50
PLPU	6.0	0.3	3.03		11				
PLSP	7.0	0.4	4.04		11				
DEPI	1.5	0.8	8.08		3				
CHAL	2.0	0.1	1.01		4				
SAKA	0.5	T	T		1				
*OPPO	74.0	3.7			6				
TOTAL		9.9				41.62			194.97

* Not computed in Percent Composition

Precipitation Data

R. G. #8 - Demer Exclosure
October 15 to April 15 -------- 1.85
April 15 to July 1 ------------ 5.52
July 1 to September 1 --------- Not Read
September 1 to October 15 ----- 0.50
Season Total ----------- 7.87
Long Term Average ------------ 8.29

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimate

Dutch Nick Flat Exc. 7/14/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base200	Total Weight Gms/200 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
BOGR	3643.0	18.17	92.4	6.0	198	610.97	3.09	.17	293.27
POSE	161.0	.81	4.1	5.7	55	40.78	.74	.25	19.57
ANNUAL FORBS	132.0	.66	3.5		33	46.37	1.41	.35	22.26
LEDE	34.5	.17	0.9		27				
LATE	2.0	.01	0.1		3				
CHAL	1.0	.01	0.1		2				
AST SPP.	0.5	T	T		1				
PLPU	94.0	.47	2.4		44				
*OPPO	375.0	1.88	--		58				
TOTAL		19.64				698.12			335.10

*Not computed in percent composition

Precipitation Data:

R. G #4 Dutch Nick Flat

October 15 to April 15	- 1.65	September 1 to October 15	- .00
April 15 to July 1	- 4.75	Season Total	- 6.72
July 1 to September 1	- .32		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Farson Exc. 8/13/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	162.0	8.1	--		9				
*CHVI	3.0	0.2	--		4				
AGSM	24.5	1.2	42.86		19	11.31	.60	.46	54.29
STCO	14.0	0.7	25.00		7	4.51	.64	.32	21.65
ORHY	2.0	0.1	3.57		1	.34	.34	.17	1.63
SIHY	7.0	0.4	14.29		2	1.92	.96	.27	9.22
POSE	3.0	0.2	7.14		1	.97	.97	.32	4.66
CAEL	3.5	0.2	7.14		3	.55	.18	.16	2.64
*SEDE	37.0	1.9	--						
TOTALS		2.8				19.60			94.09

* Not computed in percent composition

Precipitation Data:

R. G. #2 Farson Exclosure

October 15 to April 15	- 2.00	September 1 to October 15	- .00
April 15 to July 1	- 2.81	Season Total	- 5.10
July 1 to September 1	- .29		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Granite Mtn. Exclosure Non-spray 8/22/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occur-rences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	204.0	10.20			11				
AGSM	15.0	.75	9.57		16	23.78	1.49	1.59	114.14
POSE	30.5	1.53	19.54		15	5.79	.39	.19	27.79
POFE	101.0	5.05	64.51		16	38.85	2.43	.38	186.48
SIHY	.5	.03	.38		1	.13	.13	.26	.62
ANNUAL FORBS	9.0	.47	6.00		18	1.89	.11	.21	9.07
FROV	4.5	.23	2.94		9				
UNK ANNUAL	2.5	.13	1.66		5				
ERI SPP.	.5	.03	.38		1				
AST SPP.	1.5	.08	1.02		3				
*PIHO	18.5	.93			8				
TOTAL		7.83				70.44			338.10

*Not computed in percent composition

Precipitation Data:

R. G. #6 Granite Mtn. Exclosure

October 15 to April 15	- 3.07	September 1 to October 15	- .26
April 15 to July 1	- 3.65	Season Total	- 7.19
July 1 to September 1	- .21		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Granite Mt. Exclosure Sprayed 8/22/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	19.0	.95	--		2				
AGSM	39.0	1.95	18.93		18	97.56	5.42	2.50	469.26
POFE	145.0	7.25	70.38		18	67.48	3.75	.47	323.90
POSE	10.5	.53	5.15		9	4.47	.50	.43	21.46
KOCR	3.5	.18	1.75		2	1.90	.95	.54	9.12
SIHY	1.0	.05	.49		1	.21	.21	.21	1.01
ANNUAL FORBS	6.5	.34	3.30		12	3.66	.31	.56	17.57
PROV	3.5	.18	1.75		7				
ERI SPP.	.5	.03	.29		1				
AST SPP.	2.5	.13	1.26		4				
*PHHO	5.5	.28	--		5				
TOTAL		11.87				175.28			842.32

*Not computed in percent composition.

Precipitation Data:

R.G. #6 Granite Mt. Exclosure

October 15 to April 15	- 3.07	September 1 to October 15	- .26
April 15 to July 1	- 3.65	Season Total	- 7.19
July 1 to September 1	- .21		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 No. Plots 20

Cover Determined by Area Estimate

Halogeton Exclosure #1 7/15/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 200	Total Weight Gms/200 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
ATNU	2221.0	11.11	88.73		20	1254.99	62.75	.56	602.40
*ARSP	98.5	0.50	--		3	34.55	11.52	.35	16.58
SIHY	95.0	0.48	3.79		18	37.59	2.09	.40	18.04
POSE	7.5	0.04	0.30		3	6.79	2.26	.91	3.26
ANNUAL FORBS	126.0	0.64	5.04		70	61.83	.88	.49	29.68
LATE	26.5	0.13	1.06		12				
LEDE	5.0	0.03	0.20		4				
EUSE	11.0	0.06	0.44		10				
CLLU	2.0	0.01	0.08		1				
OEAL	37.5	0.19	1.50		15				
LARE	18.5	0.09	0.74		8				
DEPI	7.0	0.04	0.28		7				
MONU	14.5	0.07	0.58		7				
GIPU	2.5	0.01	0.10		4				
GILE	1.5	0.01	0.06		2				
PERENN-IAL FORBS	53.5	0.27	2.14		30	13.69	.46	.26	6.57
HAGL	13.0	0.07	0.52		12				
ALTE	40.5	0.20	1.62		18				
*OPPO	36.5	0.04	--		3				
TOTAL		12.52				1409.44			676.53

*Not computed in percent composition

Precipitation Data:

R. G. #24 Halogeton Exclosure #1

October 15 to April 15	- 1.09	September 1 to October 15	- .06
April 15 to July 1	- 5.59	Season Total	- 7.89
July 1 to September 1	- 1.15		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 No. Plots 20

Cover Determined by Area Estimate

Halogeton Exclosure Two 7/15/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 200	Total Weight Gms/200 /sq.ft.	Average Weight per Plot Occurrences $\frac{F}{E}$	Wgt./ Unit Basal Area $\frac{F}{A}$	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
ATNU	2,814.0	14.07	91.15		172	1,342.29	67.11	.48	644.30
TESP	0.5	.01	.06		1	.03	.03	.06	.01
SIHY	35.5	.18	1.17		30	32.70	2.97	.92	15.70
ANNUAL FORBS	213.5	1.07	6.91		382	104.46	5.22	.48	50.14
LEDE	34.5	.17	1.10		67				
LATE	73.5	.37	2.40		118				
HAGL	44.5	.22	1.42		83				
EUSE	12.0	.06	.39		22				
OEAL	33.5	.17	1.10		63				
DEPI	4.5	.02	.13		9				
MONU	1.5	.01	.06		3				
AST. SP.	2.5	.01	.06		3				
GIPU	6.5	.03	.19		13				
SAKA	.5	.01	.06		1				
PERENNIAL FORBS	22.5	.11	.71		44	9.07	.65	.40	4.35
ALTE	22.5	.11	.71		44				
*OPPO	4.5	.02			3				
TOTAL		15.44				1,488.55			714.50

* Not computed in percent composition

Precipitation Data:

R. G. #23 - Halogeton Exclosure #2

October 15 to April 15	- 1.09
April 15 to July 1	- 5.59
July 1 to September 1	- 1.15
September 1 to October 15	- 0.06
Season Total	- 7.89
Long Term Average	- 5.48

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimate

Halogeton Exclosure Three 7/16/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 200	Total Weight Gms/200 /sq. ft.	Average Weight per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
ATNU	3086.5	15.43	95.02		153	1322.88	86.64	.43	634.98
SIHY	6.0	.03	.18	15.2	8	1.35	.17	.22	.65
ANNUAL FORBS	134.0	.68	4.19		190	54.76	.28	.41	26.28
LATE	78.0	.39	2.40		84				
HAGL	19.0	.10	.62		35				
OEAL	19.0	.10	.62		36				
SIS SP.	.5	T	T		1				
LEDE	8.5	.04	.25		17				
EUSE	1.5	.01	.06		3				
DEPI	3.0	.02	.12		6				
GIPU	2.5	.01	.06		5				
KOSC	.5	T	T		1				
MATA	1.5	.01	.06		2				
PERENNIAL FORBS	16.0	.08	.49		31	6.69	.22	.42	3.21
ALTE	16.0	.08	.49		31				
*OPPO	3.0	.02	.12		2				
TOTAL		16.24				1385.68			665.12

* Not computed in percent composition

Precipitation Data:

R. G. #23 - Halogeton Exclosure #3

October 15 to April 15	= 1.09
April 15 to July 1	= 5.59
July 1 to September 1	= 1.15
September 1 to October 15	= 0.06
Season Total	= 7.89
Long Term Average	= 5.48

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 20

Cover Determined by Area Estimate

Horse Creek Exc. (AGSP Type) 7/31/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	211.0	10.55	-		10				
AGSP	82.5	41.25	99.0	20.1	18	54.99	3.06	.67	263.95
POSE	11.0	.55	1.0	8.0	7	10.80	1.54	.98	51.84
AGSM	1.0	.05	T	42.0	2	5.60	2.80	5.60	26.88
*PHHO	6.0	.30	-		2				
*OPPO	21.0	1.05	-		3				
TOTAL		41.85				71.39			342.67

* Not computed in percent composition

Precipitation Data:

R. G. #12 - Horse Creek Exc. (AGSP Type)

October 15 to April 15	= 4.20
April 15 to July 1	= 5.46
July 1 to September 1	= 4.05
September 1 to October 15	= .02
Season Total	= 13.73
Long Term Average	= 11.60

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Horse Creek Exc. (AGSM Type) 7/31/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	214.0	10.70	-		9				
AGSM	49.5	2.48	49.0	21.2	20	40.88	2.04	.83	196.22
POSE	47.5	2.37	46.5	7.3	17	10.26	.60	.22	49.25
SIHY	0.5	.03	.5	25.0	1	.19	.19	.04	.91
BRTE	0.5	.03	.5	9.0	1	.02	.02	.01	.10
ANNUAL FORBS	3.5	.18	3.5		7	.10	.01	.03	.48
LARE	2.0	.10	2.0		4				
CHAL	0.5	.03	.5		1				
DEPI	1.0	.05	1.0		2				
*OPPO	3.0	.15	-		1				
TOTAL		5.09				51.45			246.96

*Not computed in percent composition

Precipitation Data:

R. G. #12 - Horse Creek Exc. (AGSM Type)

October 15 to April 15	= 4.20
April 15 to July 1	= 5.46
July 1 to September 1	= 4.05
September 1 to October 15	= .02
Season Total	= 13.73
Long Term Average	= 11.60

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Kane Deer Exclosure 8/12/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F - E	Wgt./ Unit Basal Area F $\frac{F}{A}$ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
AGSP	21.50	1.08	58.70		12	22.38	1.87	1.04	107.42
POSE	5.00	.25	13.59		3	1.77	.59	.35	8.50
ANNUAL FORBS	6.50	.33	17.93		8	.65	.08	.10	3.12
PERENNIAL FORBS	3.50	.18	9.78		3				
OPPO	2.00	.10	5.43		1				
PHHO	1.50	.08	4.35		2				
TOTAL		1.84				24.80			119.04

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Kirby Creek 7/17/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
SAVE*	60.0	3.00							
AGSM	35.0	1.75	14.29	15.0	8	37.88	4.74	1.08	181.82
POSE	9.0	.45	3.67	3.5	4	2.54	.64	.28	12.19
BRTE	17.3	.86	7.02	4.0	11	13.96	1.27	.80	67.01
HOPU	.1	.01	.01	--	1	.05	.05	.50	.24
ANNUAL FORBS	183.4	9.17	75.00		20	166.01	8.30	.91	796.85
SAKA	165.1	8.25	67.70						
LEPE	12.4	.62	5.06						
ATAR	3.3	.16	1.31						
KOSC	2.1	.11	.90						
LATE	.4	.02	.02						
PLSP	.1	.01	.01						
PERENNIAL FORBS	.1	.01	.01		2	.35	.18	3.5	1.68
SPCO	.1	.01	.01						
TOTAL		12.25				220.79			1059.79

*Not computed in percent composition

Precipitation Data:

R. G. #77 Kirby Creek

October 15 to April 15 -
April 15 to July 1 - 7.11
July 1 to September 1 - .32
September 1 to October 15 - .01

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Lower Gov't. Draw Exc. Non-Spray 8/21/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	207.5	10.38			9				
AGSM	30.0	1.50	36.94		20	48.37	2.42	1.61	232.18
POSE	18.0	0.90	22.17		13	6.83	.53	.38	32.78
STCO	12.0	0.60	14.78		6	13.43	2.24	1.12	64.46
BRTE	1.0	0.05	1.23		2	1.28	.24	1.28	6.14
PERENNIAL FORBS	.05	0.03	0.74		1	.14	.14	.03	.67
SPCO	0.5	0.03	0.74		1				
ANNUAL FORBS	19.0	0.98	24.14		23	6.25	.27	.33	30.00
LAC. SP.	0.5	0.03	0.74		1				
GIPU	0.5	0.03	0.74		1				
AST. SP.	0.5	0.03	0.74		1				
LEDI	5.5	0.28	6.90		11				
DEPI	1.5	0.08	1.97		3				
PLPU	1.0	0.05	1.23		2				
CHAL	2.0	0.10	2.46		4				
UNK. ANNUAL FORBS	7.5	0.38	9.36		12				
TOTAL		4.06				76.30			366.23

* Not computed in percent composition

Precipitation Data:

R. G. #16 - Lower Gov't. Draw Exc. - Non Spray

October 15 to April 15	= 3.35
April 15 to July 1	= 6.20
July 1 to September 1	= .15
September 1 to October 15	= .28
Season Total	= 9.98
Long Term Average	= 9.78

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Lower Government Draw Sprayed 8/21/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
AGSM	37.0	1.85	42.52		19	72.04	3.79	1.95	345.79
POSE	11.5	.58	13.33		9	10.78	1.20	.94	51.74
BRTE	15.0	.75	17.24		11	18.64	1.69	1.24	89.47
STCO	16.0	.80	18.39		4	25.22	6.31	1.58	121.06
KOCR	5.0	.25	5.74		2	4.29	2.15	.86	20.59
ANNUAL FORBS	6.0	.32	2.78		12	2.50	.21	.42	12.00
CHAL	0.5	.03	0.06		1				
CAMI	0.5	.03	0.06		1				
LEDI	1.0	.05	0.12		2				
DEPI	0.5	.03	0.06		1				
PLSP	1.0	.05	0.12		2				
UNK #1	2.0	.10	2.30		4				
UNK #2	0.5	.03	0.06		1				
TOTAL		4.35				133.47			640.65

Precipitation Data:

R. G. #16 Lower Government Draw

October 15 to April 15	- 3.35	September 1 to October 15	- .28
April 15 to July 1	- 6.20	Season Total	- 9.98
July 1 to September 1	- .15		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 20

Cover Determined by Area Estimate

McGraw Flat 8/22/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	164.0	8.20	--		14				
AGSM	16.0	.80	15.12		18	18.60	1.03	1.16	89.28
POSE	16.0	.80	15.12		12	2.08	.17	.13	9.98
POFE	70.0	3.50	66.16		15	28.10	1.87	.40	134.88
ANNUAL FORBS	3.0	.16	3.03		6	.22	.04	.07	1.06
LAC SPP.	.5	.03	.57		1				
MINT UNK	1.5	.08	1.51		3				
ANNUAL PERENN-IAL FORBS	1.0	.05	.95		2				
	.5	.03	.57		1	.02	.02	.04	.10
*PHHO	8.0	.40	--		6				
SPCO	.5	.03	.57		1				
TOTAL		5.29				49.02			235.30

*Not computed in percent composition.

Precipitation Data:

R. G. #14 McGraw Flat

October 15 to April 15	- 2.67	September 1 to October 15	- .20
April 15 to July 1	- 5.67	Season Total	- 8.97
July 1 to September 1	- .43		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

North Butte Thermopolis Relict 7/22/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	155.0	7.75	---		9				
AGSP	174.0	8.70	78.23	22.95	20	138.13	6.90	.79	663.02
STCO	4.0	.20	1.80	12.00	3	.93	.31	.23	4.46
POSE	31.5	1.58	14.21	41.06	17	3.41	.20	.01	16.37
CAFI	6.0	.30	2.70	11.20	6	2.44	.41	.40	11.71
ANNUAL FORBS	2.5	.17	1.08		6	.55	.09	.02	2.64
GIPU	0.5	.03	.27		1				
LARE	0.5	.03	.27		1				
DEPI	1.5	.08	.27		3				
MUDI	0.5	.03	.27		1				
PERENNIAL FORBS	3.0	.17	1.53		6	.16	.03	.05	.77
SPCO	1.0	.05	.45		2				
ARHO	0.5	.03	.27		1				
ERPU	0.5	.03	.27		1				
CRAC	0.5	.03	.27		1				
ALTE	0.5	.03	.27		1				
*OPPO	20.5	1.03	-		2				
*PHHO	9.5	.48	-		6				
TOTAL		11.12				145.62			698.97

* Not computed in percent composition

Precipitation Data:

R. G. #79 - Thermopolis Weather Bureau Station

October 15 to April 15	= 4.86
April 15 to July 1	=10.10
July 1 to September 1	= .41
September 1 to October 15	= .05
Season Total	=15.42
Long Term Average	=13.69

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Round Top Thermopolis 7/29/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	7.0	.35	-		7				
AGSP	289.0	14.45	76.8	22.1	19	155.88	8.20	.54	748.22
POSE	17.5	.88	4.7	5.6	15	10.00	.67	.57	48.00
UNKNOWN GRASS	0.5	T	T		1	.01	.01	-	.05
CAFI	69.5	3.48	18.5	11.2	16	15.33	.95	.22	73.58
ANNUAL FORBS	1.0	T	T		2	.19	.09	.19	.91
PEN.SP.	0.5	T	T		1	.02			
UNKNOWN FORB	0.5	T	T		1	.17			
TOTAL		18.81				181.41			870.76

* Not computed in percent composition

Precipitation Data:

R. G. #79 - Round Top Thermopolis

October 15 to April 15	= 4.86
April 15 to July 1	=10.10
July 1 to September 1	= .41
September 1 to October 15	= .05
Season Total	=15.42
Long Term Average	=13.69

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimate

Sand Gulch Exclosure 7/17/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency %Base 200	Total Weight Gms/200 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
ATNU	2420.20	12.10	85.63	-	143	1727.97	12.08	.71	829.43
AGSM	273.35	1.37	9.70	25.0	119	360.86	3.03	1.32	173.21
STHY	20.05	.10	.71	12.0	9	23.94	2.66	1.19	11.50
POSE	65.55	.33	2.34	13.0	39	30.22	.77	.46	2.42
BRTE	27.50	.14	.99	14.0	88	40.65	.46	1.48	3.25
AGCR	3.20	.02	.14	32.0	6	.26	.04	.08	.12
ORHY	1.00	.01	.07	18.0	1	.01	.01	.01	T
BRJA	.05	T	T	-	1	.26	.26	5.2	.02
ANNUAL FORBS	12.00	.06	.42		104	9.78	.09	.82	4.69
SAKA	2.90	.01	.07						
LATE	3.30	.02	.14						
HAGL	.05	T	T						
EUSE	.05	T	T						
ATAR	3.60	.02	.14						
LEDE	.35	T	T						
CAMI	1.75	.01	.07						
PERENNIAL FORBS	.10	T	T		1	.06	.06	.60	T
SPCO	.05	T	T						
ALTE	.05	T	T						
*OPPO	281.35	1.41	-		35				
TOTAL		14.13				2194.01			1024.64

* Not computed in percent composition

Precipitation Data:

R. G. #72 Sand Gulch Exclosure

October 15 to April 15	- 2.36	September 1 to October 15	- 0.02
April 15 to July 1	- 7.02	Season Total	- 9.65
July 1 to September 1	- 0.25	Long Term Average	- 9.86

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study-Study Area #2 T - NE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	23.0	2.30	---		2				
AGSM	4.0	.40	3.88		4	3.71	.93	.93	35.62
POSE	7.0	.70	6.80		4	2.28	.57	.33	21.89
BOGR	92.0	9.20	89.32		6	14.41	2.40	.16	138.34
*OPPO	2.0	.20	---		1				
TOTALS		10.30				20.40			185.85

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #2 T - SE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	44.5	4.45	--		5				
AGSM	1.0	.10	1.03		1	.87	.87	.87	8.35
POSE	8.0	.80	8.21		5	3.39	.68	.42	32.54
BOGR	84.0	8.40	86.15		8	18.79	2.35	.22	180.38
STCO	1.0	.10	1.03		1	.63	.63	.63	6.05
ANNUAL									
FORBS	3.0	.30	3.07		6	1.37	.23	2.00	13.15
PLPU	.5	.05	0.51		1				
LEDE	2.0	.20	2.05		4				
DEPI	.5	.05	0.51		1				
PERENNIAL									
FORBS	.5	.05	0.51		1	.26	.26	.52	2.50
SPCO	.5	.05	0.51		1				
*OPPO	16.0	1.60	--		1				
TOTALS		9.75				25.31			242.97

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #2 T - SW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	22.0	2.20	--		3				
AGSM	1.5	.15	3.23		2	1.25	.63	.83	12.00
POSE	9.0	.90	19.35		4	2.98	.75	.33	28.61
BOGR	35.0	3.50	75.26		4	7.47	1.87	.21	71.71
ANNUAL FORBS	.5	.05	1.08		1	--			
DEPI	.5	.05	1.08		1				
PERENNIAL FORBS	.5	.05	1.08		1	.26	.26	.52	2.50
ALTE	.5	.05	1.08		1				
*OPPO	27.0	2.70	--		3				
TOTALS		4.65				11.96			114.82

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #2 T - NW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	100.0	10.00	--		3				
POSE	5.5	.55	8.08		6	2.37	.40	.43	22.75
BOGR	59.0	5.90	86.13		8	21.13	2.64	.36	202.85
STCO	2.5	.25	3.65		2	.59	.30	.24	5.66
ANNUAL FORBS	1.5	.15	2.19		3	.49	.16	.33	4.70
LEDE	1.0	.10	1.46		2				
PLPU	.5	.05	0.73		1				
TOTALS		6.85				24.58			235.96

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study- Study Area #4 T - NE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	38.00	3.80	--		5				
AGSM	4.00	.40	3.59		5	1.93	.39	.48	18.53
ORHY	3.50	.35	3.14		2	3.70	1.85	1.06	35.52
BOGR	97.00	9.70	86.99		5	9.25	1.85	.10	88.80
POSE	5.00	.50	4.48		5	1.68	.34	.34	16.13
ANNUAL									
FORBS	2.00	.20	1.80		4	.19	.05	.09	1.82
LEDE	1.50	.15	1.35		3				
PLPU	.50	.05	.45		1				
*OPPO	40.00	4.00	--		4				
TOTALS		11.15				16.75			160.80

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #4 T - SE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	30.0	3.00	--		1				
AGSM	4.5	.45	5.84		6	3.42	.57	.76	32.83
STCO	3.0	.30	3.90		2	2.56	1.28	.85	24.58
ORHY	2.0	.20	2.60		1	.96	.96	.48	9.22
BOGR	50.0	5.00	64.93		5	13.38	2.68	.27	128.45
POSE	8.0	.80	10.39		4	3.29	.82	.41	31.58
ANNUAL									
FORBS	7.0	.70	9.09		12	5.67	.47	.81	54.43
LEDE	5.0	.50	6.49		8				
DEPI	1.0	.10	1.30		2				
PLPU	1.0	.10	1.30		2				
PERENNIAL									
FORBS	2.5	.25	3.25		2	1.13	.57	.45	10.85
SPCO	2.5	.25	3.25		2				
*OPPO	56.0	5.60	--		2				
TOTALS		7.70				30.41			291.94

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #4 T - SW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	15.00	1.50	--		1				
POSE	6.00	.60	7.19		5	3.89	.78	.65	37.34
BOGR	72.00	7.20	86.22		8	18.81	2.35	.23	180.58
ANNUAL FORBS	4.50	.45	5.39		12	3.62	.30	.80	34.75
LEDE	3.50	.35	4.19		10				
PLPU	.50	.05	.60		1				
DEPI	.50	.05	.60		1				
PERENNIAL FORBS	1.00	.10	1.20		2	.52	.26	.52	4.99
SPCO	1.00	.10	1.20		2				
*OPPO	23.00	2.30	--		3				
TOTALS		8.35				26.84			257.66

*Not computed in percent composition

Precipitation Data:

R G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study- Study Area #4 T - NW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	77.00	7.70	--		4				
AGSM	2.50	.25	2.39		4	1.14	.29	.46	10.94
POSE	12.00	1.20	11.48		7	3.48	.50	.29	33.41
BOGR	85.00	8.50	81.34		6	12.79	2.13	.15	122.78
STCO	4.00	.40	3.83		2	.68	.34	.17	6.53
ANNUAL									
FORBS	.50	.05	.48		1	.08	.08		.77
LEDE	.50	.05	.48		1				
PERENNIAL									
FORBS	.50	.05	.48		1	.05	.05	.01	.48
SPCO	.50	.05	.48		1				
*OPPO	25.00	2.50	--		1				
TOTALS		10.40				18.22			174.91

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study-Study Area #7 T - NE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	34.0	3.40	--		4				
AGSM	5.0	.50	13.16		7	7.08	1.01	1.42	67.97
POSE	5.5	.55	14.47		4	2.78	.70	.51	26.69
STCO	1.0	.10	2.63		1	1.61	1.61	1.61	15.46
BOGR	26.0	2.60	68.42		2	5.08	2.54	.20	48.77
ANNUAL									
FORBS	.5	.05	1.32		1	.69	.69	1.38	6.62
LEDE	.5	.05	1.32		1				
*OPPO	25.0	2.50	--						
TOTALS		3.80				17.24			165.51

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #7 T - SE 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	122.0	12.20	--		7				
AGSM	5.5	.55	19.30		8	10.23	1.28	1.86	98.21
POSE	5.0	.50	17.54		3	2.21	.74	.44	21.22
BOGR	13.0	1.30	45.62		3	4.05	1.35	.31	38.88
STCO	2.5	.25	8.77		2	2.51	1.26	1.00	24.10
SIHY	.5	.05	1.75		1	.90	.90	1.80	8.64
ANNUAL									
FORBS	1.0	.10	3.51		2	.14	.07	.14	1.34
LEDE	1.0	.10	3.51		2				
PERENNIAL									
FORBS	1.0	.10	3.51		2	.57	.29	.57	5.47
SPCO	1.0	.10	3.51		2				
*OPPO	27.0	2.70	--						
TOTALS		2.85				20.61			197.86

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study - Study Area #7 T - SW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	47.0	4.70	--		5				
AGSM	4.0	.40	14.55		7	3.73	.53	.93	35.81
POSE	5.5	.55	20.00		5	2.60	.52	.47	24.96
BOGR	13.0	1.30	47.27		2	.77	.39	.06	7.39
STCO	2.5	.25	9.09		2	6.82	3.41	2.73	65.47
ANNUAL									
FORBS	2.0	.20	7.27		4	1.53	.38	.77	14.69
LEDE	2.0	.20	7.27		4				
PERENNIAL									
FORBS	.5	.05	1.82		1	.30	.30	.06	2.88
SPCO	.5	.05	1.82		1				
*OPPO	37.0	3.70	--		2				
TOTALS		2.75				15.75			151.20

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study — Study Area #7 T - NW 9/7/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	86.0	8.60	--		3				
AGSM	4.5	.45	9.09		6	5.83	.97	1.07	55.97
POSE	3.0	.30	6.06		2	1.35	.68	.45	12.96
BOGR	39.0	3.90	78.79		4	6.76	1.69	.17	64.90
ORHY	1.0	.10	2.02		1	1.38	1.38	1.38	13.25
ANNUAL FORBS	1.5	.15	3.03		2	.87	.44	.58	8.35
LEDE	1.5	.15	3.03		2				
PERENNIAL FORBS	.5	.05	1.01		1	.39	.39	.08	3.74
SPCO	.5	.05	1.01		1				
*OPPO	7.0	.70	--		2				
TOTALS		4.95				16.58			159.17

*Not computed in percent composition

Precipitation Data

R. G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study—Study Area #8 T - NE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	16.0	1.60	--		2				
AGSM	4.0	.40	16.0		4	3.32	.83	.83	31.87
POSE	5.0	.50	20.0		2	1.80	.90	.36	17.28
BOGR	12.0	1.20	48.0		5	4.21	.84	.35	40.42
ANNUAL FORBS	4.0	.40	16.0		6	7.74	1.29	1.94	74.30
LEDE	4.0	.40	16.0		6				
*OPPO	10.0	1.00	--		3				
TOTALS		2.50				17.07			163.87

*Not computed in percent composition

Precipitation Data:

R G. #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #8 T-SE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	53.0	5.30	--		2				
AGSM	4.0	.40	9.64		6	3.18	.53	.80	30.53
POSE	2.5	.25	6.02		2	.29	.15	.12	2.78
BOGR	26.0	2.60	62.66		2	7.08	3.54	.27	67.97
STCO	1.5	.15	3.61		2	1.01	.51	.67	9.70
ANNUAL FORBS	7.5	.75	17.97		9	12.59	1.40	1.68	120.86
LEDE	7.0	.70	16.87		8				
PLPU	.5	.05	1.20		1				
*OPPO	.5	.05	--		1				
TOTAL		4.15				24.15			231.84

*Not computed in percent composition.

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #8

October 15 to April 15 - 2.50
April 15 to July 1 - 5.58
July 1 to September 1 - .33
September 1 to October 15 - .32
Season Total - 8.73

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #8 T-SW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occur-rences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	77.0	7.70	--		4				
POSE	7.5	.75	14.71		3	2.35	.78	.31	22.56
BOGR	42.0	4.20	82.35		4	9.65	2.41	.23	92.64
ANNUAL FORBS	1.5	.15	2.94		3	.34	.11	.23	3.26
LEDE	1.5	.15	2.94		3				
*OPPO	79.0	7.90	--		3				
TOTAL		5.10				12.34			118.46

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #8

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Basal Estimate

Shoshoni Ant Study ~ Study Area #8 T - NW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	84.5	8.45	--		5				
AGSM	3.0	.30	10.34		5	3.62	.72	1.21	34.75
POSE	1.5	.15	5.17		3	.90	.30	.60	8.64
BOGR	24.0	2.40	82.76		2	3.84	1.92	.16	36.86
ANNUAL									
FORBS	.5	.05	1.72		1	.02	.02	.04	.19
LEDE	.5	.05	1.72		1				
*OPPO	7.0	.70	--		3				
TOTALS		2.90				8.38			80.44

*Not computed in percent composition

Precipitation Data:

R G #48 Shoshoni Ant Study

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #9 T-NE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occur-rences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	102.5	10.25	--		6				
AGSM	4.5	.45	4.52		4	4.02	1.01	.89	38.59
POSE	31.5	3.15	31.66		5	2.66	.53	.08	25.54
BOGR	62.0	6.20	62.31		4	4.79	1.20	.07	45.98
CAEL	1.0	.10	1.01		2	.09	.05	.09	.86
ANNUAL FORBS	.5	.05	.50		1	.33	.33	.66	3.17
LEDE	.5	.05	.50		1				
*OPPO	52.0	5.20	--		3				
TOTAL		9.95				11.89			114.14

*Not computed in percent composition.

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #9

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Stason Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 X 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #9 T-SE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Compo-sition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occur-rences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	3.0	.30	--		1				
AGSM	1.5	.15	1.40		3	.40	.13	.27	3.84
POSE	7.0	.70	6.51		4	1.07	.27	.15	10.27
BOGR	98.0	9.80	91.15		5	13.06	2.61	.13	125.38
ANNUAL									
FORBS	.5	.05	.47		1	.02	.02	.04	.19
LEDE	.5	.05	.47		1				
PERENNIAL									
FORBS	.5	.05	.47		1	.02	.02	.04	.19
SPCO	.5	.05	.47		1				
*OPPO	15.0	1.50	--		1				
TOTAL		10.75				14.57			139.87

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #9

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #9 T-SW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	157.0	15.70	--		5				
AGSM	11.0	1.10	26.51		9	9.39	1.04	.85	90.14
POSE	16.0	1.60	38.56		6	2.58	.43	.16	24.77
STCO	5.5	.55	13.25		3	5.63	1.88	1.02	54.05
BOGR	7.0	.70	16.87		1	2.31	2.31	.33	22.18
ANNUAL FORBS	2.0	.20	4.81		4	1.12	.28	.56	10.75
LEDE	1.5	.15	3.61		3				
PLPU	.5	.05	1.20		1				
TOTAL		4.15				21.03			201.89

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #9

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #9 T-NW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	52.0	5.20	--		5				
AGSM	12.5	1.25	32.89		9	14.27	1.59	1.14	136.99
POSE	16.0	1.60	42.11		6	4.64	.77	.29	44.54
BOGR	3.0	.30	7.89		3	.85	.28	.28	8.16
ANNUAL FORBS	5.5	.55	14.48		11	.46	.04	.08	4.42
LEDE	4.0	.40	10.53		8				
PLPU	1.5	.15	3.95		3				
PERENNIAL FORBS	1.0	.10	2.63		2	.04	.02	.04	.38
ALTE	1.0	.10	2.63		2				
*OPPO	25.0	2.50	--		1				
TOTAL		3.8				20.26			194.49

*Not computed in percent composition.

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area 9

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #11 T-NE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	57.0	5.70	--		5				
AGSM	1.5	.15	1.71		2	.97	.49	.65	9.31
POSE	3.0	.30	3.43		2	.49	.25	.16	4.70
BOGR	78.5	7.85	89.72		7	14.02	2.00	.02	134.59
ANNUAL FORBS	3.0	.30	3.43		6	1.30	.22	.43	12.48
LEDE	3.0	.30	3.43		6				
PERENNIAL FORBS	1.5	.15	1.71		3	.46	.15	.03	4.42
SPCO	1.5	.15	1.71		3				
*OPPO									
TOTAL		8.75				17.24			165.50

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #11

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #11 T-SE 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	8.0	.80	--		1				
AGSM	1.0	.10	1.16		1	.90	.90	.90	8.64
POSE	9.5	.95	11.05		5	2.66	.53	.28	25.54
BOGR	67.0	6.70	77.91		8	12.15	1.52	.18	116.64
STCO	1.0	.10	1.16		1	.62	.62	.62	5.95
ANNUAL FORBS	7.5	.75	8.72		12	13.12	1.09	1.75	125.95
PLPU	1.0	.10	1.16		2				
LEDE	5.5	.55	6.40		8				
DEPI	1.0	.10	1.16		2				
*OPPO	25.0	2.50	--		1				
TOTALS		8.60				29.45			282.72

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #11

October 15 to April 15 - 2.50
April 15 to July 1 - 5.58
July 1 to September 1 - .33
September 1 to October 15 - .32
Season Total - 8.73

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #11 T-SW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	27.0	2.70	--		4				
AGSM	2.0	.20	3.54		3	1.09	.36	.55	10.46
POSE	11.0	1.10	19.47		5	1.74	.35	.16	16.70
BOGR	40.0	4.00	70.80		5	11.49	2.30	2.87	110.30
ANNUAL									
FORBS	2.5	.25	4.42		5	5.90	1.18	2.36	56.64
LEDE	2.5	.25	4.42		5				
PERENNIAL									
FORBS	1.0	.10	1.77		2	.19	.09	.19	1.82
SPCO	1.0	.10	1.77		2				
*OPPO	11.0	1.10	--		2				
TOTALS		5.65				20.41			195.92

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #11

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 No. Plots 10

Cover Determined by Area Estimate

Shoshoni Ant Study Study Area #11 T-NW 9/6/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 10	Total Weight Gms/10 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 9.6
	A	B	C	D	E	F	G	H	I
*ARTR	31.0	3.10	--		3				
AGSM	9.5	.95	19.19		9	8.39	.93	.88	80.54
POSE	2.0	.20	4.04		1	.36	.36	.18	3.46
BOGR	32.0	3.20	64.65		3	1.73	.58	.05	16.61
STCO	1.0	.10	2.02		1	.66	.66	.66	6.34
ANNUAL									
FORBS	4.0	.40	8.08		8	.69	.09	.17	6.62
PLPU	1.0	.10	2.02		2				
DEPI	0.5	.05	1.01		1				
LEDE	2.0	.20	4.04		4				
GIPU	0.5	.05	1.01		1				
PERENNIAL									
FORBS	1.0	.10	2.02		2	.17	.09	.17	1.63
SPCO	1.0	.10	2.02		2				
*OPPO	2.0	.20	--		1				
TOTAL		4.95				12.00			115.20

*Not computed in percent composition

Precipitation Data:

R. G. #48 Shoshoni Ant Study, Study Area #11

October 15 to April 15	- 2.50	September 1 to October 15	- .32
April 15 to July 1	- 5.58	Season Total	- 8.73
July 1 to September 1	- .33		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — Plot No. 20

Cover Determined by Area Estimate

Smilo Exclosure Non-Spray 7-27-64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq, ft.	Average Weight per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	112.0	5.60	-	-	5.0	-	-	-	-
AGSM	30.5	1.53	31.0	20.27	15.0	6.93	.46	.23	33.26
BOGR	19.0	.95	19.0	15.00	5.0	2.41	.48	.13	11.57
POSE	26.0	1.30	27.0	7.67	16.0	2.47	.15	..09	11.86
FEOC	5.5	.28	6.0	3.14	11.0	1.41	.13	.26	6.77
STCO	3.0	.15	3.0	40.00	1.0	5.64	5.64	1.88	27.07
SIHY	5.0	.25	5.0	19.67	3.0	3.23	1.08	.65	15.50
ANNUAL FORBS	8.5	.43	9.0	-	16.0	4.54	.28	.53	21.79
PLSP	8.5	.43	9.0	-	16.0	-	-	-	-
TOTAL		4.89				26.63			127.82

* Not Computed in Percent Composition

Precipitation Data:

R, G. #34 - Smilo Exclosure

October 15 to April 15	- 2.37
April 15 to July 1	- 5.35
July 1 to September 1	- Not Read
September 1 to October 15	- 0.68
Season Total	- 8.40
Long Term Average	- 9.09

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Smilo Exc. Spray 7/27/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
AGSM	36.5	1.83	27.0	23.07	14	29.04	2.07	.80	139.39
POSE	34.0	1.70	26.0	8.14	14	3.39	.24	.10	16.27
SIHY	12.5	0.63	9.0	21.60	5	9.75	1.95	.78	46.80
BOGR	13.0	0.65	10.0	20.67	3	3.08	1.03	.24	14.78
BRTE	18.5	0.93	14.0	15.07	15	9.51	.63	.51	45.65
FEOC	13.0	0.65	10.0	3.22	20	4.50	.23	.35	21.60
ANNUAL FORBS	5.5	0.28	4.0		10	3.04	.30	.55	14.59
PLSP	4.5	0.23	3.0		8				
DEPI	1.0	0.05	1.0		2				
*OPPO	24.0	1.20	-		2				
TOTAL		6.67				62.31			299.08

* Not computed in percent composition

Precipitation Data:

R. G. #36 - Macaroni Pit

October 15 to April 15	= 2.37
April 15 to July 1	= 5.35
July 1 to September 1	↓
September 1 to October 15	= .68
Season Total	= 8.40
Long Term Average	= 9.09

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Sweetwater 7/30/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	108.0	5.40	-		6				
*ARNO	67.0	3.35	-		2				
*CHVI	20.0	1.00	-		2				
AGSM	26.0	1.30	19.26		18	11.54	.64	.44	55.39
ORHY	8.0	.40	5.93		3	1.61	.54	.20	7.73
KOCR	7.5	.38	5.63		10	2.29	.23	.30	10.99
STCO	39.0	1.95	28.89	11.0	16	11.15	.70	.29	53.52
POSE	8.0	.40	5.93		11	.41	.04	.51	1.97
CAFI	36.0	1.80	26.67	9.0	12	6.22	.51	.17	29.86
CAEL	5.5	.28	4.15		9	.18	.02	.33	.86
ANNUAL FORBS	4.0	.21	3.10		5	.14	.03	.35	.67
LATE	.5	.03	.44		1				
AST. SP.	3.0	.15	2.22		3				
CHAL	.5	.03	.44		1				
PERENNIAL FORBS	.5	.03	.44		1	.71	.71	1.42	3.41
ALTE	.5	.03	.44		1				
*PHHO	8.0	.40	-		4				
TOTAL		6.75				34.25			164.40

* Not computed in percent composition

Precipitation Data:

R. G. #11 - Sweetwater
October 15 to April 15 = Reset
April 15 to July 1 = 4.49
July 1 to September 1 = .70
September 1 to October 15 = Not Read
Season Total =
Long Term Average =

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimate

Two Mile Hill Exc. 7/20/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 200	Total Weight Gms/200 /sq.ft.	Average Weight Per Plot Occurrences F÷E	Wgt./ Unit Basal Area F÷A	Pounds Per Acre F x .48
	A	B	C	D	E	F	G	H	I
*ATNU	1,552.7	7.76	-		133	745.00	5.60	.48	357.60
BRTE	899.5	4.49	92.96		192	718.88	3.74	.80	345.06
ORHY	14.5	.07	1.45		9	16.82	1.87	1.16	8.07
POSE	2.0	.01	.21		2	.04	.02	.02	.02
SIHY	10.0	.05	1.04		5	6.37	1.27	.64	3.06
ANNUAL FORBS	40.0	.21	4.34		65	13.44	.21	.33	6.45
LATE	17.0	.09	1.86		32				
LEDE	5.5	.03	.62		11				
OECA	11.0	.06	1.24		13				
HEPE	4.5	.02	.41		6				
MATA	1.5	.01	.21		2				
MONU	.5	T	T		1				
*PHHO	3.5	.02	-		3				
*OPPO	133.0	.67	-		8				
TOTAL		4.83				150.06			720.26

* Not computed in percent composition

Precipitation Data:

R. G. #39 - Two Mile Hill Exc.

October 15 to April 15	= 2.78
April 15 to July 1	= 6.53
July 1 to September 1	= ↓
September 1 to October 15	= .93
Season Total	= 10.24
Long Term Average	= 11.51

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 10 — No. Plots 20

Cover Determined by Area Estimates

West Pasture Exc. 7/9/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 200	Total Weight Gms/200/sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds per Acre F x .48
	A	B	C	D	E	F	G	H	I
*ATNU	1349.5	6.75	--		114	520.25	4.56	.39	249.72
*ARSP	40.5	.20	--		12	21.32	1.78	.53	10.23
*ARPE	19.0	.10	--		8	3.26	.41	.17	1.56
AGSM	10.0	.05	1.68	8.5	15	.23	.02	.02	.11
POSE	161.5	.81	27.18	10.0	60	32.70	.55	.20	15.70
SIHY	38.5	.19	6.38	15.9	18	38.38	2.13	1.00	18.42
ORHY	19.0	.10	3.36	19.1	18	9.18	.51	.48	4.41
BOGR	8.5	.04	1.34	5.0	3	3.02	1.01	.36	1.45
ANNUAL									
FORBS	337.5	1.70	57.04		359	369.49	1.03	1.09	177.36
MATA	212.0	1.06	35.58		156				
PLPU	41.0	.21	7.02		57				
LEDE	49.0	.25	8.39		83				
MUDI	12.5	.06	2.01		22				
LATE	6.5	.03	1.01		13				
EUSE	11.0	.06	2.01		18				
AST SPP.	2.0	.01	.34		3				
CHAL	2.5	.01	.34		5				
MONU	1.0	.01	.34		2				
PERENNIAL									
FORBS	19.0	.09	3.02		31	14.11	.46	.74	6.77
ALTE	15.5	.07	2.35		26				
OECA	3.5	.02	.67		5				
*OPPO	358.0	1.79	--		52				
TOTAL		2.98				1011.94			485.73

* Not computed in percent composition

Precipitation Data:

R. G. #13 West Pasture Exclosure

October 15 to April 15 - 1.15
April 15 to July 1 - 5.85
July 1 to September 1 - .34
September 1 to October 15 - .00
Season Total - 7.34

S E C T I O N IV

SOIL MOISTURE AND TEMPERATURE STUDIES

1964

Introduction

Studies to evaluate soil moisture and temperature characteristics as influenced by sagebrush control and livestock grazing were initiated in 1963. Soil moisture was determined by use of a neutron scattering meter. Permanent metal access tubes, two inches in diameter, were set into the ground to a depth of five feet. The neutron probe measures the amount of water in the soil through an area of about four feet in diameter. Soil temperatures were measured with thermister probes placed at 8, 15, and 22 inches below the surface. Lead cables from the buried sensitive elements were connected to a meter for an instantaneous reading of temperature. Surface temperatures were read with a portable probe.

During June, 1964 access tubes were set in two exclosures southwest of Kemmerer. Cumberland #1 Exclosure is located on a bottomland mixed shrub community of greasewood (Sarcobatus vermiculatus), big sagebrush (Artemisia tridentata), Nuttall's saltbush (Atriplex nuttallii) and green rabbitbrush (Chrysothamnus viscidiflorus). Cumberland #3 Exclosure is situated on the west side of the Bear River Divide in a dense stand of big sagebrush. The exclosures were sprayed with 2,4-D, in June, 1964 to control the shrubs. Three soil moisture access tubes were located in the sprayed and non-sprayed areas of each of the two exclosures.

1964 Results

Soil moisture content on all exclosures was generally higher in the shrub control areas than in the non-sprayed areas (Tables 1, 2, 3, 4). The letters N and S refer to non-sprayed sites and sprayed sites, respectively. A general pattern of moisture movement to the 60 inch depth was noted at the Smilo Exclosure, southeast of Worland. This was especially true in the sprayed area inside the exclosure.

A slightly greater amount of moisture was noted inside the Smilo Exclosure as compared to the outside. On the Granite Mountain Exclosure east of Lander, the situation was reversed. The significance of the data are dependent, in all analyses, upon correlating herbage production, time and amount of precipitation, and utilization with the soil moisture criteria. Insufficient data have been obtained, to date, to fully evaluate the influence of shrub control upon the vegetation.

The soil moisture access tubes which were placed in the Cumberland #1 Exclosure and the Cumberland #3 exclosure (Tables 3 and 4) show very little difference in amount of soil moisture attributable to the shrub control. This situation is normal during the first growing season following shrub control.

Soil temperatures tended to be slightly cooler in the sagebrush controlled area of Smilo Exclosure than in the non-treated area (Table 5). Temperatures in the Granite Mountain Exclosure were variable but did follow the same pattern in some instances. The significance of these data will be determined by analyses of the relationship of time and amount of precipitation, plant cover and production, soil moisture content and soil temperatures.

TABLE 1. Granite Mountain Exclosure: Soil moisture readings (inches of moisture per 12 inches of soil) as affected by sagebrush control inside and outside the exclosure - 1964 (Each figure is an average of readings in two access tubes.)

Inside Exclosure

Soil	Jan 10		May 8		July 1		Sept 4		Oct 12		Aver-
Depth	S	N	S	N	S	N	S	N	S	N	age
6"	1.97	1.69	3.52	3.23	2.58	2.30	1.74	1.58	.89	.88	2.04
12"	2.21	1.67	3.49	3.04	3.04	2.48	2.12	1.73	2.22	1.47	2.35
18"	2.30	1.59	2.98	3.14	3.34	2.96	2.47	1.71	2.27	1.82	2.45
24"	2.15	1.49	3.28	2.89	3.22	2.89	2.50	1.74	2.37	1.75	2.43
36"	1.92	1.43	2.70	2.06	2.81	2.52	2.47	1.75	2.53	1.74	2.19
48"	1.89	1.57	1.98	1.56	2.41	2.03	2.42	1.83	2.39	1.81	1.99
60"	1.68	1.48	1.51	1.47	1.86	1.46	2.00	1.53	1.81	1.74	1.65
Ave.	2.02	1.56	2.78	2.48	2.75	2.38	2.24	1.70	2.07	1.60	2.16

Outside Exclosure

6"	1.89	1.78	3.37	3.48	2.37	2.51	1.56	1.70	.92	.89	2.05
12"	2.16	1.94	3.67	3.44	3.10	2.88	2.13	2.07	1.60	1.69	2.47
18"	2.22	2.32	3.72	3.78	3.52	3.47	2.37	2.49	2.27	2.19	2.84
24"	2.07	2.25	3.09	3.15	3.39	3.43	2.33	2.42	2.38	2.50	2.70
36"	2.24	1.98	2.33	2.28	2.96	2.45	2.74	2.04	2.45	2.39	2.39
48"	1.67	1.75	1.55	1.73	1.85	2.04	2.02	1.97	2.50	1.97	1.91
60"	1.61	1.53	1.68	1.45	1.63	1.45	1.77	1.58	1.94	1.77	1.64
Ave.	1.98	1.94	2.77	2.76	2.69	2.60	2.13	2.04	2.01	1.91	2.28

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Basal Estimate

Upper Government Draw Non-Spray 8/21/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	152.50	7.63			9				
AGSM	30.00	1.50	37.31		20	19.71	.99	.66	94.61
POSE	18.00	.90	22.39		13	5.76	.44	.32	27.65
STCO	12.00	.60	14.93		6	12.09	2.02	1.00	58.03
BRTE	1.00	.05	1.24		2	.08	.04	.08	.38
ANNUAL									
FORBS	18.00	.92	22.89		30	2.62	.09	.15	12.58
LEDE	5.50	.28	6.97		11				
DEPI	1.50	.08	1.99		3				
PLPU	1.00	.05	1.24		2				
CHAL	2.00	.10	2.49		4				
UNK.	7.50	.38	9.45		9				
AST SPP.	.50	.03	.75		1				
PERENNIAL									
FORBS	1.00	.05	1.24		2	.35	.18	.35	1.68
SPCO	1.00	.05	1.24		2				
TOTAL		4.02				40.61			194.93

*Not computed in percent composition

Precipitation Data:

R. G. #16 Upper Government Draw

October 15 to April 15	- 3.35	September 1 to October 15	- .28
April 15 to July 1	- 6.20	Season Total	- 9.98
July 1 to September 1	- .15		

HERBAGE AND PRECIPITATION DATA FROM WYOMING HALOGETON EXCLOSURE STUDIES.
(PLOTS LOCATED SYSTEMATICALLY AND WEIGHTS ON OVEN DRY BASIS)

Plot Size 1 x 1 — No. Plots 20

Cover Determined by Area Estimate

Upper Government Draw Sprayed 8/21/64	Total Trans. Basal Area Percent	Average Percent Basal Area	Percent Composition	Average Height in cm.	Absolute Plot Frequency % Base 20	Total Weight Gms/20 /sq.ft.	Average Weight Per Plot Occurrences F ÷ E	Wgt./ Unit Basal Area F ÷ A	Pounds Per Acre F x 4.8
	A	B	C	D	E	F	G	H	I
*ARTR	1.0	.05	--		1				
AGSM	21.0	1.05	30.0		19	26.19	1.38	1.25	125.71
POSE	35.5	1.78	51.0		19	7.57	.40	.21	36.34
KOCR	4.5	.23	7.0		7	.96	.14	.21	4.61
STCO	3.0	.15	3.0		2	.83	.42	.27	3.98
ANNUAL FORBS	4.0	.21	8.0		8	1.28	.16	.32	6.14
PLPU	2.0	.10	5.0		4				
LAC SPP.	0.5	.03	1.0		1				
UNK.	1.5	.08	2.0		3				
PERENNIAL FORBS	0.5	.03	1.0		1	.22	.22	.44	1.06
SPCO	0.5	.03	1.0		1				
*PHHO	3.5	.18	--		2				
TOTAL		3.45				37.05			177.84

*Not computed in percent composition

Precipitation Data:

R. G. #16 Upper Government Draw

October 15 to April 15	- 3.35	September 1 to October 15	- .28
April 15 to July 1	- 6.20	Season Total	- 9.98
July 1 to September 1	- .15		

TABLE 2. Smilo Exclosure: Soil moisture readings (inches of moisture per 12 inches of soil) as affected by sagebrush control inside and outside the exclosure - 1964 (Each figure is an average of readings in two access tubes.)

Inside Exclosure

Soil	Jan 10		Mar. 3		Apr 15		May 9		June 30		Sep 6		Oct. 18		
Depth	S	N	S	N	S	N	S	N	S	N	S	N	S	N	Average
6"	2.55	2.16	2.30	2.07	2.85	2.75	3.55	3.38	3.55	1.96	1.70	1.67	.82	.86	2.30
12"	1.97	1.88	2.10	1.96	2.34	2.25	3.00	2.98	3.01	2.12	1.75	1.79	1.61	1.72	2.18
18"	1.48	1.74	1.58	1.66	1.72	1.79	2.11	2.31	2.11	1.91	1.59	1.78	1.85	1.86	1.82
24"	1.57	2.10	1.52	1.79	1.58	1.92	1.58	1.95	1.58	2.00	1.64	2.00	1.65	1.84	1.77
36"	2.05	1.91	1.60	1.84	1.92	1.93	1.96	1.83	1.96	1.85	2.12	1.91	1.81	2.04	1.91
48"	2.82	1.67	2.69	1.53	2.79	1.64	2.54	1.61	2.72	1.55	2.86	1.64	2.64	1.79	2.18
60"	2.79	1.42	2.65	1.34	2.71	1.39	2.64	1.37	2.63	1.37	2.78	1.44	2.88	1.69	2.08
Ave.	2.18	1.84	2.06	1.74	2.27	1.95	2.48	2.20	2.51	1.82	2.07	1.75	1.89	1.69	2.03

Outside Exclosure

6"	2.65	1.87	2.49	1.88	2.94	2.47	3.82	3.10	2.40	1.75	2.00	1.52	.91	.87	2.19
12"	2.04	1.86	2.04	1.83	1.86	2.06	2.94	2.78	2.36	2.06	1.94	1.76	2.05	1.54	2.08
18"	1.81	1.48	1.77	1.44	1.85	1.55	2.06	2.35	2.07	1.67	1.92	1.54	1.97	1.78	1.80
24"	1.89	1.48	1.83	1.37	1.86	1.42	1.87	1.41	1.87	1.37	2.00	1.40	1.93	1.55	1.66
36"	2.17	1.37	2.07	1.27	2.10	1.35	2.12	1.29	2.08	1.28	2.25	1.48	2.00	1.47	1.74
48"	1.67	1.74	1.58	1.71	2.16	1.74	1.63	1.66	1.64	1.70	1.74	1.78	2.04	1.86	1.76
60"	1.29	1.83	1.20	1.56	1.28	1.71	1.26	1.73	1.25	1.63	1.34	1.84	1.56	1.72	1.51
Ave.	1.93	1.66	1.85	1.58	2.01	1.76	2.24	2.05	1.95	1.64	1.88	1.62	1.78	1.54	1.82

TABLE 3. Cumberland #1 Exclosure: Soil moisture readings (inches of moisture per 12 inches of soil) as affected by sagebrush control - 1964 (Each figure is an average of readings in three access tubes.)

Soil Depth	July 22		Sept 3		Oct 17		Average
	S	N	S	N	S	N	
6"	1.31	1.39	1.29	1.95	.87	.87	1.28
12"	1.45	1.40	1.46	1.48	1.18	1.20	1.36
18"	1.54	1.63	1.65	1.73	1.66	1.59	1.63
24"	1.59	1.63	1.68	1.77	1.75	1.84	1.71
36"	1.78	1.73	1.88	1.86	1.84	1.93	1.84
48"	1.91	1.86	2.02	2.05	2.02	2.04	1.98
60"	1.95	1.82	2.02	2.01	2.16	2.01	2.00
Ave.	1.65	1.64	1.71	1.84	1.64	1.64	1.69

TABLE 4. Cumberland #3 Exclosure: Soil moisture readings (inches of moisture per 12 inches of soil) as affected by sagebrush control - 1964 (Each figure is an average of readings in three access tubes.)

Soil Depth	July 25		Sept 3		Oct 17		Average
	S	N	S	N	S	N	
6"	1.50	1.38	1.60	1.81	.90	.90	1.35
12"	1.67	1.56	1.65	1.57	1.30	1.25	1.50
18"	1.81	1.76	1.70	1.56	1.76	1.72	1.72
24"	1.84	1.71	1.80	1.58	1.85	1.74	1.75
36"	1.89	1.66	1.89	1.61	1.99	1.68	1.79
48"	1.93	1.87	1.87	1.57	2.11	1.81	1.86
60"	1.96	1.66	1.92	1.55	2.07	1.80	1.83
Ave.	1.80	1.66	1.78	1.61	1.71	1.56	1.69

TABLE 5. Soil temperature reading in degrees centigrade from Granite Mountain and Smilo Exclosures. 1964.

Granite Mountain Exclosure

	Air	Spray				Non Spray			
		1"	8"	15"	22"	1"	8"	15"	22"
May 8	17.0	14.0	2.8	2.6	2.2	16.0	3.8	3.2	3.1
July 1	31.2	32.0	16.5	14.2	12.8	32.0	18.9	14.9	13.6
Sept 4	24.9	--	14.1	14.5	14.9	--	14.5	14.8	15.0

Smilo Exclosure

May 9	15.5	15.0	8.8	9.3	10.0	15.0	8.3	9.0	10.0
June 30	31.2	35.8	23.5	20.5	20.0	33.5	24.5	20.5	20.0
Sept 6	19.9	19.5	19.0	19.0	17.0	19.5	21.0	17.5	19.5
Oct 18	11.2	7.5	12.0	11.2	14.0	8.0	12.2	13.7	15.0

S E C T I O N V

PRECIPITATION PATTERN STUDY

1964

Introduction

During the 1960 season, over 70 gauges were installed 6 to 12 miles apart throughout the Big Horn Basin and the Wind River Basin. In addition, some 25 gauges were set up under the Federal Halogeton Program in the Rawlins and Rock Springs areas. All gauges were read on the same dates four times a year - April 15, July 1, September 1, and October 15. Personnel of the Worland, Lander, Rawlins, and Rock Springs Districts of the Bureau of Land Management cooperated with the University in reading the instruments. A list of previous reports is given on page V-2.

The U. S. Weather Bureau and the U. S. Geological Survey precipitation data are used to provide additional information from independent locations. This cooperative effort provides an effective network for future evaluation of precipitation patterns. A map of precipitation gauge locations was presented in the 1963 report.

1964 Results

Precipitation data for 1964 from the University gauges are presented in Table I, while those from the U. S. Weather Bureau stations are presented in Table II.

New gauges were installed on five bird guzzlers, located in the Farson-Rock Springs area, by Wyoming Game and Fish Commission personnel. A new gauge was placed in a water holding pit southeast of Kemmerer by Bureau of Land Management personnel. In the Big Horn Basin gauges were installed on two University of Wyoming study areas - one on a deer exclosure in the juniper community east of Kane and the other within the same community south of Meeteetse.

Winter precipitation from October 15, 1963 to April 15, 1964 was low in most low elevation areas. High intensity storms during early April resulted in much snow accumulation at the higher elevations. Many areas, especially on the Owl Creek Mountains, were impassable until mid-June because of the deep drifts.

Several heavy rains occurred during the spring period from April 15 to July 1. In most low elevation areas precipitation was the highest recorded since the gauges were installed in 1960.

Summer and fall were drier than usual with many gauges showing little, if any, rainfall during either or both periods.

LIST OF PREVIOUS REPORTS

Fisser, H. G., A. A. Beetle and R. L. Lang. 1961. A study of range conditions in the Big Horn and Wind River Basins. Preliminary Report II. Wyo. Agr. Exp. Sta. Mimeo. 11 pp.

Fisser, H. G., Clayton Williams, A. A. Beetle and R. L. Lang. 1962. A study of range conditions in the Big Horn and Wind River Basins. Preliminary report III. 7 pp.

Nichols, J. T., L. C. Vosler, D. R. Smith and H. G. Fisser. 1962. Halogeton Studies. IN Cooperative Research Report to the Bureau of Land Management. 1961 Results. Wyo. Agr. Exp. Sta. Mimeo. pp. 1 - 17.

Fisser, H. G. 1963. A study of range conditions in the Big Horn and Wind River Basins. Preliminary Report IV. Wyo. Agr. Exp. Sta. Mimeo. 13 pp.

Fisser, H. G. 1964. Precipitation pattern study. Section VII. IN Cooperative Research Report to the Bureau of Land Management. 1963 Results. Wyo. Agr. Exp. Sta. Mimeo. 65 pp.

TABLE 1. PRECIPITATION DATA FOR 1964 FROM UNIVERSITY OF WYOMING GAUGES FOR THE PERIODS - OCTOBER 15-APRIL 15 (WINTER), APRIL 15-JULY 1 (SPRING), JULY 1-SEPTEMBER 1 (SUMMER), AND SEPTEMBER 1-OCTOBER 15 (FALL).

Rain Gauge Number	Rain Gauge Name	Winter	Spring	Summer	Fall	1964 Total	Long Term Average
1	Ant Hill Exc. - Worland	2.38	4.26	0.45	0.01	7.10	7.48
2	Farson Exc.	2.00	2.81	0.29	----	5.10	4.43
3	L U Juniper	----	----	----	----	Started	----
4	Dutch Nick Flats Exc.	1.65	4.75	0.32	----	6.72	7.46
5	Ant Plot Exc. - Lander	4.05	4.18	0.21	0.40	8.84	7.18
6	Granite Mountain Exc.	3.07	3.65	0.21	0.26	7.19	----
7	Buffalo Creek Exc.	N.R.	5.13	N.R.	1.11	----	----
8	Demer Exc.	1.85	5.52	N.R.	0.50	7.87	8.29
9	Gov't Draw No. 1 Exc. (North)	G.D.	5.92	0.14	0.08	----	7.70
10	Boysen Reservoir Exc.	0.20	4.12	0.10	0.10	4.52	4.77
11	Happy Springs Exc.	G.D.	4.49	0.70	N.R.	----	----
12	Horse Creek Exc.	4.20	5.46	4.05	0.02	13.73	11.60
13	West Pasture Exc.	1.15	5.85	0.34	----	7.34	6.79
14	McGraw Flat Exc.	2.67	5.67	0.43	0.20	8.97	8.65
15	15-Mile Study Pasture	1.28	G.D.	0.24	0.01	----	7.30
16	Gov't Draw No. 2 Exc. (South)	3.35	6.20	0.15	0.28	9.98	9.78
17	Burnt Wagon Exc.	1.30	4.63	0.34	----	6.27	6.39
18	Cedar Mountain Exc.	2.54	2.48	0.74	0.13	5.89	7.87
19	Radio Tower Exc.	1.55	3.13	0.81	0.15	5.64	6.36
20	Black Mountain Exc.	1.81	2.95	0.35	0.10	5.21	5.88
21	Kane Deer Exc.	----	Started	3.60	0.30	----	----
23	Sheep Springs Exc.	4.75	7.00	2.30	0.26	14.31	14.15
24	Halogeton Pasture Exc.	1.09	5.59	1.15	0.06	7.89	5.48
25	Red Wash #3 Exc.	4.32	1.21	0.60	0.83	6.96	7.36
26	Red Wash #1 Exc.	3.92	1.50	0.66	0.75	6.83	6.96
27	Little Robber #5 Exc.	5.86	2.06	0.66	0.78	9.36	8.93
28	Red Wash #2 Exc.	3.87	1.15	0.23	0.54	5.79	5.88
30	Boars Tusk Exc.	2.57	3.81	0.73	----	7.11	6.97
31	Cumberland Exc. #1	2.32	4.77	1.02	0.03	8.14	----
32	Cumberland Exc. #2	N.R.	7.27	0.64	----	----	----
33	Cumberland Exc. #3	3.57	4.80	0.37	0.02	8.76	----
34	Cumberland Exc. #4	2.22	4.11	0.93	----	7.26	----
35	Elk Mountain Pit	----	----	Started	----	----	----
36	Macaroni Pit	2.37	5.35	N.R.	0.68	8.40	9.09
37	Sand Draw	1.14	4.56	N.R.	0.44	6.14	6.40
38	Shephard Dome	2.08	6.10	N.R.	0.78	8.96	9.04
39	Two-Mile Hill Exc.	2.78	6.53	N.R.	0.93	10.24	11.50
41	Bud Kimball Exc.	3.56	6.06	N.R.	1.03	10.65	9.99
42	Little Cottonwood Res.	2.62	5.48	N.R.	0.99	9.09	10.01
43	Gov't Anderson Dry Hole	0.90	4.86	N.R.	1.00	6.76	7.11
44	Gordon	4.13	7.75	N.R.	1.02	12.90	11.37
45	Warner & Lewis	1.23	5.85	N.R.	0.85	7.93	7.57
46	Gibbs Butte	0.90	3.91	0.37	0.45	5.63	6.90
47	Muskrat	0.90	5.59	0.20	0.37	7.06	6.42
48	Fuller Seed Plot	2.50	5.58	0.33	0.32	8.73	8.46
49	Canyon Creek	1.30	3.69	0.25	0.30	5.54	8.59
50	Muskrat #5 Exc.	4.10	3.65	0.21	0.26	8.22	8.50
51	Poison Creek	G.D.	G.D.	0.22	0.44	----	8.21
52	Alkali Flats	2.27	3.74	0.23	0.53	6.77	8.72
53	Cottonwood Pass Exc.	N.R.	5.34	0.65	0.95	----	----

N.R. = Not Read
G.D. = Gauge Damaged and Replaced

TABLE I. (CONTINUED) PRECIPITATION DATA FOR 1964 FROM UNIVERSITY OF WYOMING GAUGES FOR THE PERIODS - OCTOBER 15-APRIL 15 (WINTER), APRIL 15-JULY 1 (SPRING), JULY 1-SEPTEMBER 1 (SUMMER), AND SEPTEMBER 1-OCTOBER 15 (FALL).

Rain Gauge Number	Rain Gauge Name	Winter	Spring	Summer	Fall	1964 Total	Long Term Average 1/
54	Connor	G.D.	5.17	0.25	0.40	----	----
55	Fraser Seed Plot	G.D.	G.D.	0.20	0.30	----	----
56	Logan #1 Exc.	4.10	3.96	0.19	0.23	8.48	8.08
57	Logan #2 Exc.	2.75	3.75	0.30	0.24	7.04	7.69
58	Empty Cartridge Exc.	2.74	4.12	0.22	0.34	7.42	7.17
59	Carter Divide Exc.	3.73	4.15	0.16	0.25	8.29	6.83
60	Dishpan Butte #1 Exc.	6.25	4.93	0.47	0.27	11.92	10.49
61	Dishpan Butte #2 Exc.	3.30	4.79	0.52	0.22	8.83	8.24
62	Hall Creek Divide Exc.	4.97	5.02	0.43	0.22	10.64	10.37
63	Little Popo-Agie	6.61	4.70	0.45	0.50	12.26	10.28
64	Hudson	3.47	3.99	0.08	0.12	7.66	8.33
65	Pan American	3.90	4.70	0.07	0.21	8.88	7.83
66	Buffalo	4.55	4.92	0.65	0.15	10.26	11.89
67	Madden	2.55	4.04	0.34	0.65	7.58	10.15
68	Johnston	1.20	6.15	0.12	0.83	8.30	7.15
69	No Wood	6.20	5.34	0.50	0.68	12.72	13.94
70	Andrews	1.37	6.97	N.R.	0.96	9.30	7.89
71	Hayes Brothers	2.02	7.67	N.R.	0.70	10.39	9.34
72	Seaman	2.37	10.10	N.R.	0.91	13.38	10.10
73	Black Mountain (Walker)	2.67	7.71	N.R.	0.80	11.18	9.80
74	No Water (Canal)	1.55	4.09	N.R.	0.20	5.84	6.32
75	Sand Gulch Exc.	2.36	7.02	0.25	0.02	9.65	9.86
76	Cochran Exc.	3.55	7.41	0.30	0.08	11.34	11.14
77	Kirby Creek Exc.	G.D.	7.11	0.32	0.01	----	9.07
78	Devils Slide	4.68	9.63	0.32	0.05	14.68	13.29
79	Thermopolis	4.86	10.10	0.41	0.05	15.42	13.69
80	Poison Draw	3.85	3.32	0.11	0.74	8.02	7.34
81	Mack Ranch	3.75	3.86	0.08	0.55	8.24	8.41
82	Gardner Ranch	G.D.	G.D.	0.71	0.81	----	----
83	Hayes Ranch	G.D.	7.29	0.60	0.47	----	----
84	Pumping Station	5.87	9.93	0.17	0.24	16.21	14.02
85	Bridger Creek	6.28	5.80	0.16	0.57	12.81	13.29
86	Dry Creek	1.05	4.35	0.17	0.31	5.88	6.77
87	Hoodoo Creek	0.70	3.20	0.20	0.20	4.30	5.93
88	Comet Mine	7.20	8.17	0.45	0.21	16.03	14.16
89	Birdseye Ranch	3.58	6.17	0.30	0.10	10.15	8.34
90	Birdseye Pass	G.D.	3.72	G.D.	0.11	----	8.09
91	Jones Ranch	4.75	7.44	0.18	0.21	12.58	12.01
92	Wildcat	2.15	6.14	0.31	0.04	8.64	8.17
93	Zimmerman	2.45	G.D.	0.22	G.D.	----	----
94	Lake Creek	3.05	8.58	0.22	0.22	12.07	10.22
95	Farson Guzzler #1	Started	3.14	0.51	----	----	----
96	Farson Guzzler #2	Started	3.91	0.97	0.01	----	----
97	Farson Guzzler #3	Started	3.32	0.88	----	----	----
98	Farson Guzzler #4	Started	3.78	0.82	----	----	----
99	Farson Guzzler #5	Started	3.04	0.24	----	----	----

1/ Computed for period October 15, 1963 to October 15, 1964

N.R. = Not Read
G.D. = Gauge Damaged and Replaced

TABLE II. PRECIPITATION DATA FROM THE UNITED STATES WEATHER BUREAU STATIONS FOR THE PERIOD OCTOBER 15, 1963 TO OCTOBER 15, 1964.[1]

Station Name	WINTER Oct. 15 to April 15	SPRING April 15 to July 1	SUMMER July 1 to Sept. 1	FALL Sept. 1 to Oct. 15	1964 Total[2]	Long Term Average[3]
BIG HORN BASIN:						
Anchor Dam	4.29	6.01	0.95	0.10	11.35	----
Basin	1.81	4.77	1.63	----	8.21	6.21
Big Trails	----	----	0.42	0.35	----	----
Black Mountain	5.42	9.42	0.24	0.40	15.48	----
Cody 12SE	1.50	7.51	0.69	----	9.70	----
Deaver	1.25	5.47	2.31	0.06	9.09	5.21
Emblem	1.48	6.84	0.80	0.17	9.29	----
Grass Creek	----	11.44	0.21	----	----	----
Greybull 1S	1.46	4.74	1.51	0.02	7.73	----
Heart Mountain	1.30	7.05	0.46	0.03	8.84	----
Lovell	1.37	6.26	1.99	0.04	9.66	6.92
Powell	1.09	5.96	1.12	0.05	8.22	5.67
Rairden 2WSW	2.64	4.73	0.78	0.02	8.17	----
Shell	3.26	5.49	2.91	----	11.66	----
Tensleep	2.90	----	0.54	0.09	----	----
Tensleep 19SSE	8.04	----	----	----	----	----
Thermopolis 9NE	----	----	----	----	----	----
Thermopolis 25WNW	2.37	6.36	0.44	T	9.17	----
Worland	2.00	4.94	0.46	----	7.40	7.76
Worland FAA AP	2.45	5.56	0.35	0.02	8.38	----
WIND RIVER BASIN:						
Arminto	2.13	3.73	0.35	0.37	6.58	----
Boysen Dam	2.61	8.55	0.38	0.40	11.94	----
Diversion Dam	1.45	3.73	0.06	0.23	5.47	9.45
Fort Washakie 2S	3.39	6.25	0.37	0.40	10.41	11.90
Gas Hills 4E	2.45	7.91	----	0.14	----	----
Lander WB AP	5.08	6.94	0.53	0.55	13.10	13.58
Lost Cabin 1NNE	1.45	4.12	0.85	0.72	7.14	----
Morton 1NW	2.10	4.25	0.22	0.11	6.68	----
Pavillion	1.45	3.92	0.12	T	5.49	8.67
Riverton	0.93	5.55	0.55	0.12	7.15	8.79
Sand Draw	2.71	6.64	0.32	0.16	9.83	----
Shoshoni	0.59	5.23	0.37	0.20	6.39	----
SOUTHWEST WYOMING:						
Farson	1.43	3.95	0.52	----	----	----
Kemmerer	4.09	5.55	0.37	----	----	----
Rock Springs	2.72	3.91	0.72	0.14	7.49	----
Rock Springs FAA AP	4.26	3.75	0.80	0.13	8.94	----
Wamsutter 1N	0.66	2.86	0.80	0.30	4.62	----
Muddy Gap	3.46	6.28	0.01	0.50	10.25	----
Rawlins	3.69	3.39	0.61	0.51	8.20	----

1/ Weather Bureau. 1962-1963. Climatological Data - Wyoming. U.S.Dept. Commerce. Vols.72&73

2/ Computed for the period October 15, 1963 to October 15, 1964.

3/ Weather Bureau. 1963. Climatological Data - Wyoming Annual Summary. U.S.Dept. Commerce Vol. 72, No. 13.

S E C T I O N VI

SEEDING AND FERTILIZER TRIALS IN SALTBUSH RANGELAND

The seeding and fertilizer trials were initiated in the holding pasture of the Dry Creek Halogeton Pastures, northwest of Greybull. During the summer ten large pits, eight feet wide, 30 feet long and 2 feet deep were excavated by Bureau of Land Management personnel with a large earth-moving machine. On October 29, 1964 seed was planted in a randomized block design to test the effect of the soil pitting treatment as well as the effect of nitrogen fertilization, at 50 pounds available N per acre.

All seed used in the trial were collected in the Big Horn Basin. They represented native as well as introduced species. Of the total 14 plantings, ten were grasses and four were shrubs. The species planted, seed collection site, and date of collection are listed below.

Planting Number	Species	Collection Site	Collection Date
1	Grayia spinosa	South of Big Flat Exclosure, Manderson, on sandy ridge.	1 Aug 64
2	Atriplex confertifolia	Same site as G. spinosa. Large bushes 2' high and 3' in diameter.	7 Sep 64
3	Sporobolus cryptandrus	North of Big Flat Exclosure, Manderson, on sandy ridge.	12 Jul 64
4	Sporobolus airoides	Sandy ridge below and west of Sand Gulch Exclosure, east of Thermopolis.	13 Jul 64
5	Stipa viridula	Saltbush ridge east of Sand Gulch Exclosure, east of Thermopolis.	13 Jul 64
6	Agropyron cristatum	Big Flat Exclosure, Manderson in very heavy soil, Nuttall's saltbush type. Grasses seeded in 1949. Large, late maturity plants.	1 Aug 64
7	Agropyron desertorum	Same site as A. cristatum. Small early maturing plants.	1 Aug 64
8	Elymus junceus	Same site as A. cristatum. Small plants, early seed maturity.	12 Jul 64
9	Oryzopsis hymenoides	Same site as S. cryptandrus.	12 Jul 64
10	Sitanion hystrix	Same site as S. viridula, in saltbush type.	13 Jul 64
11	Atriplex canescens	About 6 miles SE of Hyattville, 6,000' elev., ridge of reddish sedimentary material.	15 Oct 64

Planting Number	Species	Collection Site	Collection Date
12	Elymus junceus	Same site as A. cristatum. One large plant, mature, dry, and 8' north of center area that has many small ELJU plants. This plant was taller with leaves much longer than others.	12 Jul 64
13	Cercocarpus ledifolius	In juniper area near Kane Deer Exclosure at base of Big Horn Mountains, east of Lovell.	12 Aug 64
14	Agropyron smithii	Same site as G. spinosa.	1 Aug 64

Arrangements have been completed for planting, from these and other seed collections of the same species as those listed above, at the Bridger Plant Materials Center, Bridger, Montana. Comparisons of the Dry Creek Pasture seedings to those at the Plant Materials Center will provide valuable information concerning inherent forage and seed production capabilities. Future plans include seeding of these same collections at the Kane Deer Exclosure, in an area cleared of juniper.

S E C T I O N VII

SEEDING TRIALS WITH EUROTIA LANATA

A seeding trial with Eurotia lanata was conducted using four dates and two methods of seeding in a split plot design. The dates of seeding were May 6, May 17, June 1, and June 17. A fall seeding was also tried but no seedlings emerged in the Fall of 1964. Fifty seeds were planted in each of two rows, spaced 30 inches apart. The seeds were planted 2 inches apart in the row and covered with .25 inch of soil. Likewise 50 seeds were broadcast in each of two rows, approximately 30 inches apart and the plot raked with a hand rake. Seedling emergence and establishment in all plots was determined. Considerably more seedlings emerged than were considered established by a count on October 15, 1964. When planted at .25 inch depth, there was an average of 16.9 seedlings emerged per 100 seed planted, of which 7.8 were established on October 15. When broadcast, there was an average (for all planting dates) of 8.6 seedlings emerged of which 5.2 were still alive on October 15. Of the four spring planting dates, May 17, 1964 was the best with an average establishment of 11.5 plants per 100 seeds planted. This establishment was from 22.3 seedlings which emerged. It should be pointed out that the precipitation at the seeding location was very low during the growing season of 1964 - with July being particularly dry, having only .25 of an inch rainfall, as compared to an average of 1.73 inches during the period from 1931-1961. The total precipitation in 1964 from the first planting date to October 15, 1964 was only 3.74 inches. In addition to low rainfall, a number of the seedlings which had emerged were killed by severe hail on June 21.

A laboratory germination trial using 5 different temperatures was conducted with the following results after two weeks of treatment.

Temperature	Percentage Germination
85° F	77.66
68° F	86.00
58° F	82.33
40° F	85.00
30-40° F	59.00

These data indicate that temperatures of from 40° F to approximately 70° F were most conducive to high percentage germination of Eurotia lanata seed and that planting dates might be based on maximum and minimum temperatures encountered in the field.

S E C T I O N VIII

REPORT OF EUROTIA LANATA STUDIES

Seed of Eurotia lanata was collected from vigorous plants at different locations of several western states and planted in the greenhouse by Riedl, Asay and Nelson (5). Large differences were observed in seedling vigor. Seedling selections of high and low vigor were transplanted to the agronomy farm in the spring of 1959. It was observed that the high vigor selections produced the greatest subsequent growth in 1960 and 1961. In the spring of 1962 the low vigor selections were removed from the plot. The high vigor selections were allowed to cross pollinate and seed was harvested from this plot in 1962, 1963 and 1964.

Seed from this crossing block, seed of the parental strains and other superior strains will be planted in replicated test plots. Forage yield and other growth character data will be obtained and analyzed statistically to determine if any progress has been accomplished.

Forage of E. lanata plants grown in the greenhouse was oven dried. This material was then ground and analyzed by the Soils Department for its mineral composition. The results were as follows:

P = 0.2375%	Fe = 56.1 ppm
Na = 0.0068%	Mn = 29.8 ppm
K = 2.5116%	Zn = 32.9 ppm
Ca = 1.0606%	Cu = 5.5 ppm
Mg = 0.3989%	

E. lanata has been reported growing under a variety of soil conditions. Abundant stands of the species occur on dry gravelly soil on the plains and foothills of Wyoming (3, 4). It has also been found growing on the lower plains and valleys in dry soils, often impregnated with saline materials (1, 2). Vass and Lang (6) observed that in the Red Desert area of Wyoming E. lanata seemed to be more abundant on soil which was not extremely alkaline although it was found growing in a rather stunted condition on some alkali flats.

A study has been initiated to determine the effect of different levels of exchangeable sodium on the growth of E. lanata plants. Wayarne silty clay loam, obtained from the University of Wyoming Agricultural Experiment Station at Sheridan, will be used because of its high exchange capacity. The study will be conducted in the greenhouse using soils adjusted to four levels (0, 8, 16 and 24) percent of exchangeable sodium. The test will consist of four levels of exchangeable sodium soil in 6-in. clay pots and replicated four times. Eurotia lanata seed from the crossing block will be used. Data on the rate and amount of growth and yield will be obtained. In addition samples of forage from each of the four treatments will be analyzed for chemical composition.

1. Dayton, W. A. 1931. Important western browse plants. U.S.D.A. Misc. Pub. 101.

2. Esplin, A. C., J. E. Greaves, and L. A. Stoddart. 1937. A study of Utah's winter range. Utah Agr. Exp. Sta. Bull. 277.

3. Nelson, Aven. 1896. First report on the flora of Wyoming. Wyo. Agr. Exp. Sta. Bull. 28.

4. Nelson, Elias. 1902. The shrubs of Wyoming. Wyo. Agr. Exp. Sta. Bull. 54.

5. Riedl, W. A., K. H. Asay, L. J. Nelson and G. M. Telwar. 1965. Studies of Eurotia lanata - Winterfat. Wyo. Exp. Sta. Bull. 425.

6. Vass, A. F. and R. L. Lang. 1938. Vegetation composition, density, grazing capacity and grazing land values in the Red Desert Area. Wyo. Agr. Exp. Sta. Bull. 229.